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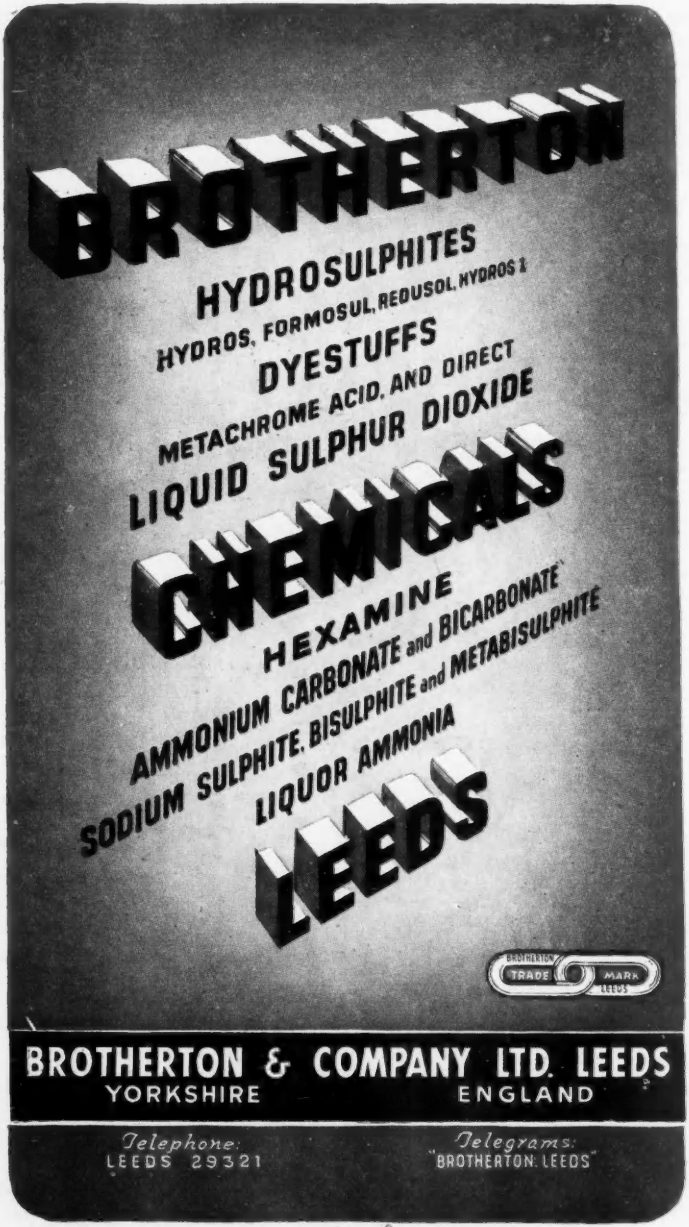

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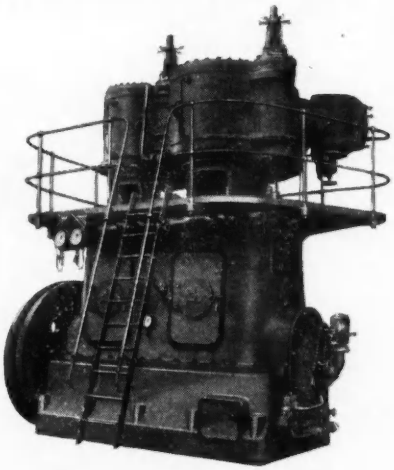

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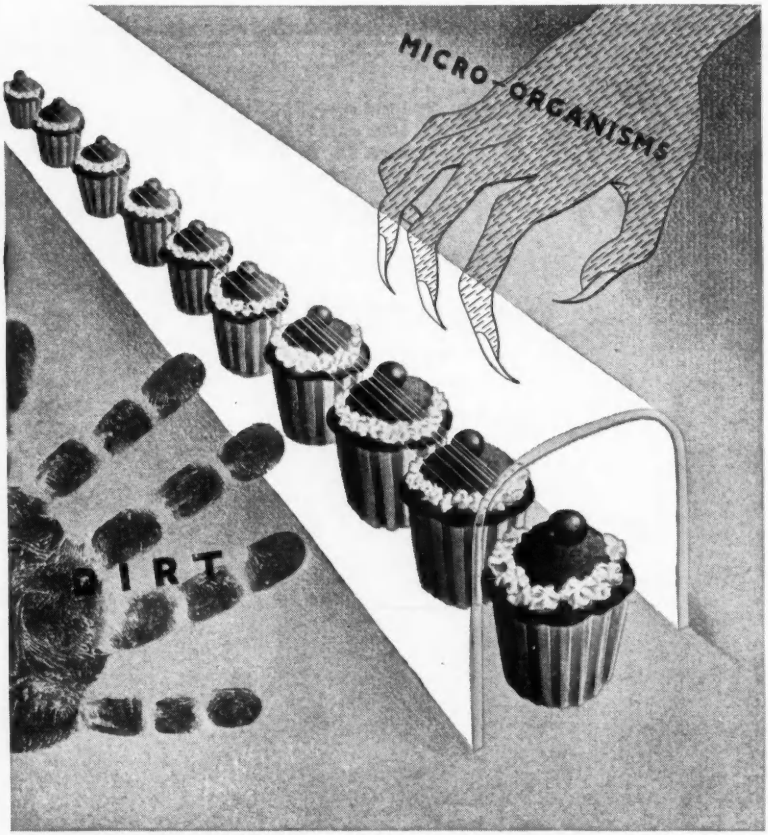

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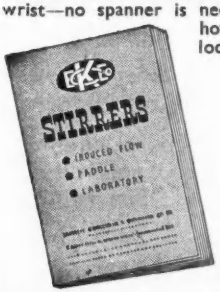

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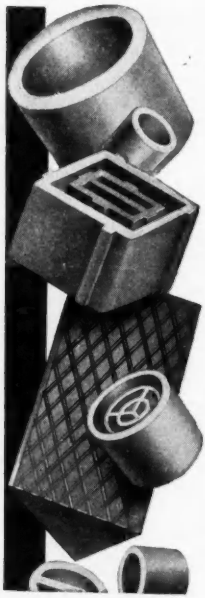

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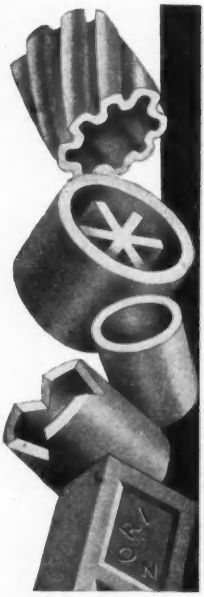

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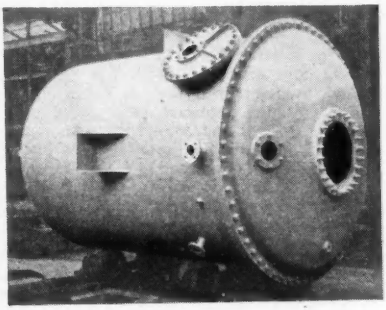

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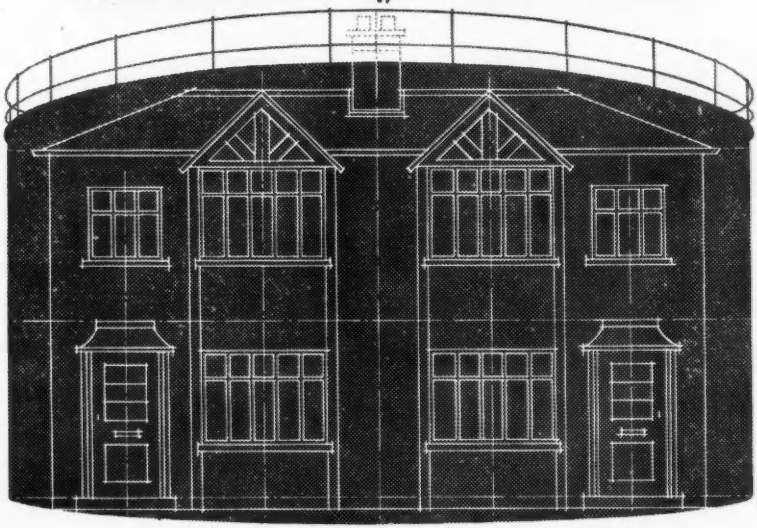

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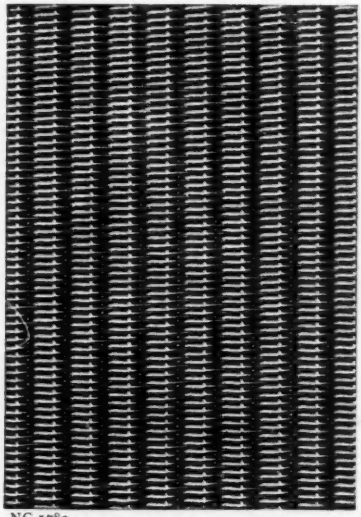

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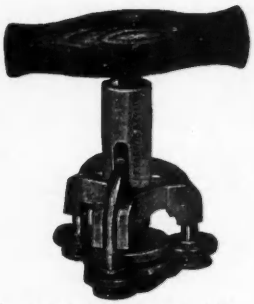

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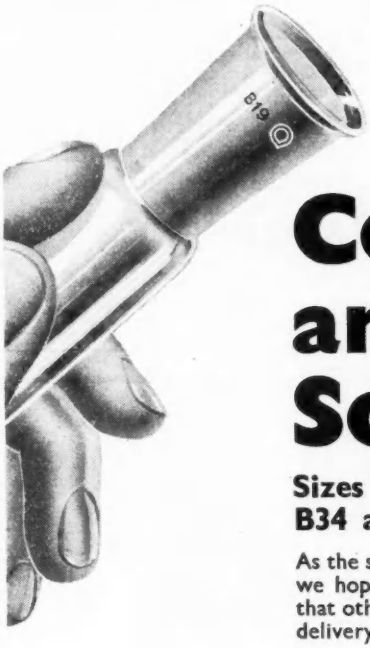

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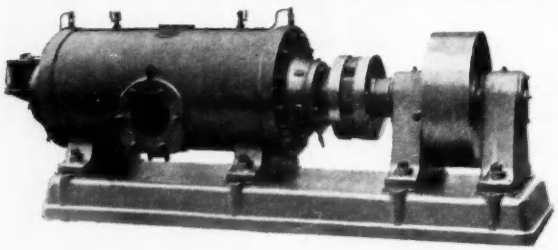

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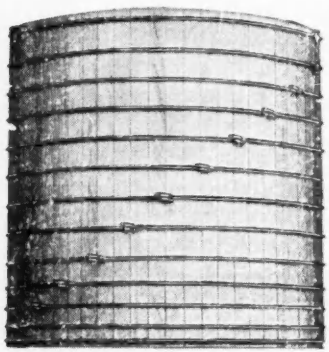

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Costly Coal

THE National Coal Board, whose third annual report presented to the nation last week gave no cause for celebration, firmly preserves its privilege of recording a disquieting state of affairs with a tranquillity which has been shared by none of its five million subscribers—and certainly none of its customers.

In reading the report and noting the confident and reassuring terms in which the chairman of the board, Viscount Hyndley, so ably introduced it to the Press at large it has not been possible to escape the impression that the coal authorities find their responsibilities far less harsh and exacting than do their counterparts in the average joint stock company, many of whom seem to find no ground for complacency in the evidence alone of greatly increased production and gross profits, often with some reduction of costs. The Coal Board, revealing an infinitely less satisfactory state of affairs, seems to have no qualms.

The unpalatable facts about the country's coal industry in 1948 cannot be wholly obscured by the evidence that the dismal picture presented in 1947 of under production at almost prohibitive costs to produce at the end a deficit of £23.25 million has been fundamentally changed for the better in 1948. Some relief may be derived from the knowledge that the vast accumulation of debt has been checked, but a few company chairmen in any other sphere, reporting a surplus of £1.7 million which the NCB had at the end of 1948, could confidently adopt the view expressed by Lord Hyndley, that "they had improved their performance to the tune of £25 million." That reflects an asumption that unprofitable working is the norm, and in the whole of this report there is little evidence that the Coal Board authorities are prepared to abide by the rules governing all (unprotected) great industries either in judging what has been achieved or planning future policy.

The actual results achieved by the colliery industry are fortunately, if not wholly reassuring, no longer marked by the alarming inadequacy apparent a year before. While the failure to reach the modest target set by the Government (211 million tons) has not been forgotten, the rise in mined output of 10.4 million tons (5½ per cent) to a total of 197.6 million tons has removed the disgrace of having to depend upon American production for some of our essential needs. The measure of that improvement was the ability to export 16 million tons and make available 9 million tons more for home use.

Such improvements as these, however, have required the stimulus of a

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combination of favourable conditions which cannot be enhanced year by year to ensure that the trend is continued. There were 800 more mineworkers (237,000 fewer than the Government hoped), a much more ample equipment of coal cutting and conveying machinery and financial resources which only the artificial conditions of a sellers' market can provide. It cost in 1948 46s. to raise a ton of coal and a heavy charge upon the national funds must finally have resulted were coal prices not now inflated to an unparalleled extent. To secure a profit sufficient to cover operating costs, pay the current instalment of the colliery purchase price and retain a small balance it was necessary to charge home users on an average an additional 5s. per ton and to increase export prices sufficiently to secure around 7s. (6s. 11½d.) per ton more from all sources. Of this temporary increment, which clearly cannot be duplicated or even maintained in increasingly competitive conditions, nearly 4s. 4d. per ton was required to cover the increase in the average cost of production, of which 2s. 9d. was absorbed by enlarged wages costs.

The question which arises spontaneously in this connection seeks an assurance that the further rise which 1948 has brought in the cost of coal-getting is the last—heavy industry can stand no further enlargement of "the coal tax," and foreign users are already turning to other and cheaper sources of supply. According to Lord Hyndley, this tide has indeed turned. "The cost curve," he discloses, "was flattening out towards the end of 1948. In 1949 it has started to fall." Whether that overdue reversal has continued will not be known until the Coal Board makes its next annual report. If the board permits anything to stand in the way of producing cheaper coal, such as miners' prejudices against machine methods and employment of foreign workers, or itself indulges in excessive spending for "social" ends before much fuller production has been achieved, it will stand condemned by any standard, and doubly damned by the criterion which the Labour Chancellor of the Exchequer has set for all other industries. One of the most competent judges of the economics of coal, Sir Charles Reid, indicated earlier this year that coal users would be fortunate to see a rebate of 5s. per ton on present prices before the year 1965. (THE CHEMICAL AGE, *60*, 439). The latest report of the National Coal Board contains nothing to prove that his estimate was unduly pessimistic.

Notes and Comments

Balanced Views on Steel

THE full extent of the powers contained in the host of provisions of the Iron and Steel Bill, to which such cursory treatment was given under the "guillotine" method of limiting unwelcome debate in the House of Commons, has been revealed now in its true and disconcerting proportions. The credit for that goes to the retention of the right to adequate debate by the House of Lords, whose proceedings last week and this have ensured that no one henceforth should plead ignorance of the sweeping powers the Government is seeking—to make chemicals or tennis rackets or almost anything else—if it should in fact, realise its ambition to be the monopolists of large-scale steel production in Britain. In the course of one day's debate last week the Government leaders in the Lords were obliged to accept the principle of a series of precautionary amendments to ensure that the proposed corporation—should it come into being—shall not be a "closed shop," disregarding representatives of consumers and of the independent steel interests and industrial interests in general. It was significant that several of these safeguards, such as those relating to the protection of consumers and the limitation of steel companies and subsidiaries to their present spheres, unless Parliament sanctions their extension, were determinedly opposed by the Socialists and had to be carried to division before they were adopted. Britain's steel industry is, of course, by no means as irrevocably "in the bag" as it is pretended; but there is little doubt that the final prospect of gaining intelligent and equitable legislation for steel would be slender in the absence of the balanced revisionary powers of the Lords.

Mining and Metallurgy

SIXTEEN countries of the British Commonwealth and 11 others, including the U.S.A., will be represented at the Fourth Empire Mining and Metallurgical Congress to be held in Great Britain from July 9 to 23. It will bring together scientists and industrialists from the most remote parts of the earth, and almost every land under the British flag, to deal realistically with mining within the Empire and with the metallurgical processes by which the products can be turned to use. The history of civilisation is intimately bound up with the advance of knowledge of minerals and of metals, so that this congress may in the long run have a value which cannot be wholly expressed in terms of the results in industry. The duration of the congress, the number of members taking part, and the wide scope of its proceedings indicate that it will be on a much larger scale than its predecessors at Wembley (1924), Canada (1927), and South Africa (1930). Since then, the growth of mining and the extension of oil refining and of metallurgical processes has entirely changed the Commonwealth position. So far as metals are concerned, except for copper, the Commonwealth could be almost entirely independent in a time of crisis.

Conservation

IT is a fortunate coincidence that the locating of the congress in England corresponds with a period when mining commands more interest than ever before and the department of coal recovery is subject to more critical attention than has ever been given it. The concurrent Colonial Month and Colonial Exhibition in London should help to lend point to and illuminate some of the topics broached at the congress. From the viewpoint of visitors from relatively coalless Continental countries the spectacle of the apparent improvidence in this country presented by smoking chimney stacks will not escape notice, although from our own point of view the circumstance that nearly one-fifth of the coal used here is now made to yield its tar, benzole, ammonia, etc., affords grounds for satisfaction. In the realm of petroleum,

in which nearly all the countries to be represented have projects to increase the yield of the national product or to use coal to supplement it, the British and American contributions should be the most authoritative. Apart from these specialised considerations, however, the congress will afford opportunity for scientists, engineers and others concerned with the mining and metallurgical industries to meet and discuss technical progress and problems, among which development of the mineral resources of the Commonwealth are most deserving of attention. After sessions in London, technical meetings will be held at Oxford, Edinburgh and Newcastle-upon-Tyne. The outcome of these should be of more than academic interest and whatever findings are reached cannot be dissociated from the current readiness in the U.S.A. to collaborate fully in opening up new territories and the forthcoming conference on world resources under the auspices of Unesco.

The Open Door

THE importance of informal personal contacts between research workers was emphasised at the official opening in London last week of the Ciba foundation for the promotion of international co-operation in medical and chemical research. Sir Henry Dale, who declared the building open, referred to science as being at present "the poor helpless conscript" of destruction, and appealed to the foundation "to keep open a door for the eventual return to sanity," and in the meantime to invite those countries behind the "iron curtain," whenever opportunity occurred. He pointed out that where international congresses of large numbers tended to stifle full, uninhibited discussion of new knowledge, the dignity and restful atmosphere of this elegant building could not fail to encourage confidence in the scientists fortunate enough to be among the experts invited. Lord Beveridge, a member of the trustees (the others being Lord Horder, chairman, Prof. E. D. Adrian and Mr. Raymond Needham, K.C., who has been the inspiring genius, as well as the legal adviser), said that the foundation, lacking laboratories of its own, might yet prove "a successful laboratory for mixing scientists." It is appropriate that this new centre of research should owe its conception to Switzerland which through two world wars has remained a beneficent source of international goodwill through the Red Cross. It is good to feel the visiting experts will carry away with them pleasant recollections of all that is best in English architecture and comfort inspired by the quiet charm of this house in Portland Place.

Personal Productivity

MR. A. P. YOUNG, chairman of the Institution of Works Managers, in his report on industrial productivity in the U.S.A., gives an interesting account of those factors in American industry which he considers should be better known in this country, and of techniques employed there which might with advantage be applied in British manufacturing establishments. He bases his views on what he saw on a five weeks' visit to the U.S.A. Mr. Young does not discredit the widely accepted view that the key to greater productivity is more horse power per worker. In America, he writes, the power driven has been more effectively harnessed, so that there is seven horse power at the command of every worker in the manufacturing industries compared with three in Britain. Against this, the "bouquet" handed to the British worker is a reassuring confirmation of our ability to deliver the goods, when given the technical and other equipment required. Mr. Young quotes a leading representative of the U.S. Bureau of Labour Statistics as saying: "When you compare the personal productivity in the two countries there is nothing in it. If anything, the Britisher may be working a little harder." There is much loose talk about this supreme question of relative productivity says Mr. Young, and much of it has been unfair to the British worker who, despite the discouragement offered by an atmosphere of austerity which has prevailed for nearly ten years, is doing a magnificent job of work.

SOLVENTS PRICE REDUCTIONS

Acetic Acid and Anhydride

REDUCTIONS of prices of acetic acid and acetic anhydride, following the reduction in price of ethyl alcohol (THE CHEMICAL AGE, *60*, 833), are announced this week by British Industrial Solvents, Ltd. The new prices are effective from June 1.

Certain alterations have been made in the tonnage categories scheduled, but the reductions amount to some £7-£8 per ton for glacial acid and £3 per ton for acetic anhydride. With the cessation of Government control, it is again possible to make contracts for the supply of these materials, states the B.I.S. announcement.

Government Stocks

There still remain substantial Government stocks of all grades of acetic acid which B.I.S. and other suppliers have undertaken to liquidate. Until these are cleared it may be necessary to supply acid in such containers as are now in use.

Price schedules for BISOL acetic acid for dispatches on and after June 1 for 10-ton lots (or contract) range from £73 per ton for glacial 99/100 per cent BP to £60 per ton for 80 per cent technical.

Deliveries in carboys involve an addition of £7 per ton, and in demijohns £11 per ton. Glacial acid cannot be supplied in carboys.

BISOL acetic anhydride price for dispatches on and after June 1 for 10-ton lots (or contract) is quoted as £100 per ton, for 1-ton spot £101 per ton, or 1 × 90 gal. drums £102 per ton.

There are the usual additional charges for delivery in carboys or demijohns and an abatement of £2 per ton for 2500-gal. loads.

A New Look

THIS number of THE CHEMICAL AGE, the 1564th and the first of the 61st volume, differs in two respects from all its predecessors. The chief departure from what has been rendered familiar by many years' usage is the introduction of new type faces in some of the headings and, more conspicuously, in the text, which has gained in boldness and "readability." The other minor change relates to the cost of single copies and is enforced by the continued high level of costs of production, especially of paper, and of distribution. Single copies now cost ninepence or, post paid, one shilling. The annual subscription (30s.) is unaltered.

MORE STANDARDISATION ?

Official Investigation Set Up

THE increasing usefulness of standardisation and the growing volume of work likely to fall on the British Standards Institution have been recognised by the appointment by the Government of a committee to consider the constitution, finance and organisation of the institution.

The members of the committee, which is to begin work at once under the chairmanship of Mr. Geoffrey Cunliffe (British Aluminium Co., Ltd.) are: Sir William Palmer (British Rayon Federation); Mr. A. V. Nicholls (Automotive Engineering Co., Ltd.); Mr. Roger Duncalfe (British Glues & Chemicals, Ltd.); Mr. E. P. Harries (Trades Union Congress); Mr. O. W. Humphreys (General Electric Co., Ltd.); and Sir Ernest Leman (chairman of the Ministry of Supply Committee on Engineering Standardisation).

Mr. Harold Wilson, President of the Board of Trade, who announced the formation and terms of reference of the committee, said that the Government was convinced that standardisation should be encouraged, and that industry, working with the British Standards Institution, should do the work. It was hoped that the committee would report by the end of the year.

BMA Exhibition

AMONG the diversity of drugs and pharmaceuticals on view at the British Medical Association Exhibition which concluded at Harrogate yesterday, Glaxo Laboratories, Ltd., were showing heptalgin and penicillin products.

Streptomycin, supplies of which are allocated in Britain by the health authorities, was also presented by Glaxo, which this year supplied 220 hospitals in England and Wales, compared with 30 at the time of last year's exhibition. Large-scale production will begin at Ulverston in the next few months.

A great advance in liver extract preparation is represented by its accurate standardisation as a result of the achievements of Shorb—who developed a microbiological method of assay—and of Rickes, Brink and others in the U.S.A., and Dr. Lester Smith, senior biochemist of Glaxo Laboratories, in isolating the anti-anaemic factor as a pure crystalline substance.

Fuller German Production of Key Chemicals

The Search for Export Markets

ALTHOUGH the official index of German industrial production for May indicated an advance by 5 to 87 points (1936 = 100), chemical manufacturers in Western Germany do not all report a further increase in output. The production of soda in particular has begun to decline, a fact said to be due to smaller calls from domestic consumers, and the output of washing agents has also fallen sharply since the beginning of the year.

Compared with the corresponding period of 1948, however, most important chemicals, including sulphuric acid, calcium carbide, nitrogenous fertilisers, soap and dyestuffs, show an output increase of about 50 per cent. The production of caustic soda and phosphate fertilisers has risen about 60 and 80 per cent respectively and the rayon output has more than doubled.

To Belgium and Italy

As the domestic market seems to be approaching saturation point, more attention is being paid to exports. In the trade agreement with Belgium which covers the 12 months ending June, 1950, Western Germany has undertaken to supply the equivalent of £105 million worth of chemicals, which will thus account for one-tenth of all West German exports to Belgium, excluding coal. Italy is to receive the equivalent of £1.25 million worth of chemicals from Western Germany.

The potash industry especially reposes great hopes on an expansion of exports, more particularly to Belgium and to the United Kingdom. Production in the Anglo-U.S. zone during January-May this year amounted to 245,500 metric tons of K_2O, equal to an annual output of 590,000 tons, which compares with a production of 485,000 tons in 1948 and a pre-war consumption in the area of the Anglo-U.S. zone of 529,000 tons.

While limited quantities are being sent to the French occupation zone, where the local output of 70,000 tons of K_2O annually is not sufficient to meet the requirements of agriculture, appreciable quantities can now again be exported, and the works in the British zone have recently resumed foreign shipment of potash salts. The works in the U.S. zone resumed exports earlier this year.

After resumption of operations in the Hugo pit of the Bergmannssegen works at Lehrte, Lower Saxony, efforts are now being made to reopen more potash works. Preparations to this end have been made at the Koenigshall-Hindenburg and Riedel works.

Estimates of fertiliser production in the year ending June, 1950, indicate that substantial increases are expected for all major products. An output of 400,000 tons of N, 460,000-475,000 tons of P_2O_5 and 615,000 tons of K_2O is anticipated, compared with a monthly output in April last of 27,400, 21,000 and 50,900 tons respectively. If these estimates are met, there will still be a shortage of basic slag and cyanamide and difficulties may be encountered in respect of all nitrogenous fertilisers. Manufacturers of potash, phosphate and compound fertilisers, however, believe that they will be able to meet all demands.

The quick pace of reconstruction in the rayon industry is shown by the increase of production at the Rheinische Zellwolle A.G., Siegburg, from 30 tons daily in January to 55 tons in June. The price of rayon has meanwhile been lowered from Dm. 3.60 to Dm. 2.95-3.20 per kg.

Operations have begun in a shale oil refinery erected by Lias Oelschiefer Forschungs-G.m.b.H. at Frommern, South Wuerttemberg, in the French zone of Germany. The plant capacity is 10,000 tons a year, and the refinery will thus be able to deal with the whole of the crude shale oil obtained at the distillation plant. This has been in operation at Frommern since May, 1947, producing a crude oil with a high sulphur content which can be used only by certain types of engines.

TRADE WITH SWEDEN

CHEMICALS and minerals, to the value of about £1 million, were included in the goods for which the Swedish authorities indicated they were prepared to grant additional import licences, at the recent trade talks in Stockholm between Britain and Sweden.

The delegations reviewed the working out of the trade and payments arrangements for 1949 reached during talks in London at the end of last year.

It was estimated that despite certain reductions in the value of Swedish exports to the U.K., the Swedish authorities would be able to afford additional imports from this country to about £6 million above the originally anticipated figure.

Machinery and vehicles and textiles were among the products covered by this sum.

CHEMICAL EXPORTS AGAIN INCREASE

Value of May Totals Exceeds £8 Million

FOR the first time since January this year, chemical exports from the United Kingdom in May reached a total of more than £8 million.

Totals given in the latest issue of *The Trade and Navigation Accounts* of the U.K. were £8,091,749 compared with £6,983,784 in May, 1948, and £5,115,005 in the corresponding month of 1947.

Some notable individual increases compared with May, 1948, were those of ammonium sulphate, 32,386 tons against 12,756 tons; methyl alcohol, 12,756 gal. from 6546 gal.; formic acid, 5641 cwt. from 1844 cwt.; and sodium sulphate, 46,698 cwt. compared with 14,153 cwt.

Exports of chemicals, drugs, dyes and colours for the first five months of 1949 reached a total of £37,603,367 which showed an increase of £4,654,682 over the same period of 1948 and £12,182,954 over 1947.

CHEMICAL EXPORTS

	May 1949	May, 1948
	Cwt.	Cwt.
Formic acid	5,641	1,844
	Lb.	Lb.
Salicylic acid and salicylates	173,534	143,665
Value of all other sorts of acid	£108,587	£76,697
	Tons	Tons
Aluminium oxide	1,111	1,052
Sulphate of alumina	2,369	1,678
All other sorts of aluminium compounds	391	311
Ammonium sulphate	32,386	12,756
Ammonium nitrate	10,644	6,146
All other sorts of ammonium compounds	1,680	1,758
	Cwt.	Cwt.
Bleaching powder	33,022	19,828
All other bleaching materials	7,732	6,698
	Gal.	Gal.
Cresylic acid	60,627	263,764
Tar oil, creosote oil, anthracene oil, etc.	4,077,401	4,597,170
Value of all other sorts of tar oil	£19,006	£46,613
	Cwt.	Cwt.
Collodion cotton	4,258	3,405
	Tons	Tons
Copper sulphate	4,643	1,872
	Cwt.	Cwt.
Disinfectants, insecticides, etc.	42,200	68,040
	Tons	Tons
Fertilisers	832	6,295
	Cwt.	Cwt.
Nickel salts	6,214	2,515
	Tons	Tons
Lead acetate, litharge, red lead, etc.	4,336	13,413
	Gal.	Gal.
Tetra-ethyl lead	90,841	123,513
	Tons	Tons
Magnesium compounds	873	1,139
	Gal.	Gal.
Methyl alcohol	12,756	6,546
	Cwt.	Cwt.
Potassium compounds	5,227	7,567
	Tons	Tons
Salt	23,479	18,651
	Cwt.	Cwt.
Sodium carbonate	299,649	328,509
Caustic soda	254,561	207,875
Sodium silicate	20,485	14,680
Sodium sulphate	46,698	14,153
All other sodium compounds	80,739	85,964
Cream of tartar	758	231
Tin oxide	467	440
	Tons	Tons
Zinc oxide	950	1,156
Total value of chemical manufactures, excluding drugs and dyestuffs	£4,504,460	£3,872,561

	Oz.	Oz.
Quinine and quinine salts	156,693	82,391
	Lb.	Lb.
Acetyl-salicylic acid	116,877	129,882
	·100 International units	100 International units
Insulin	951,170	828,555
	Mega units	Mega units
Penicillin	577,961	349,252
Total value of drugs, medicines, and preparations	£1,790,990	£1,268,375
Total value of dyes and dyestuffs	£757,876	£654,816
	Cwt.	Cwt.
Plastic materials	32,099	29,269
Value	£427,989	£390,769
	Cwt.	Cwt.
Chemical glassware	1,483	1,670
Value	£53,415	£53,649
	Cwt.	Tons
Fans	3,369	232
Value	£100,074	£131,748
	Cwt.	Tons
Furnace plant	6,546	405
Value	£75,713	£74,574
	Cwt.	Tons
Gas and chemical machinery	16,817	702
Value	£185,491	£144,426

CHEMICAL IMPORTS

	May, 1949	May, 1948
	Cwt.	Cwt.
Acetic acid	11,740	28,553
Boric acid	7,680	7,460
All other sorts	1,036	4,603
Borax	36,300	7,040
Calcium carbide	—	3,044
Coal tar products (excluding benzol and cresylic acid)	—	8,485
Cobalt oxides	539	1,277
	Tons	Tons
Arsenic	272	800
Fertilisers	2,425	413
	Lb.	Lb.
Iodine	66,056	66,050
	Cwt.	Cwt.
Potassium chloride	999,854	1,001,926
Potassium sulphate	13,340	18,880
All other potassium compounds	3,914	1,220
Sodium nitrate	99,700	—
All other sodium compounds	5,693	2,869
Carbon blacks (from natural gas)	38,788	48,678
Total value of chemicals, drugs, dyes and colours	£2,435,606	£2,643,381

Chemical Derivatives of Coal Gases

Practical Results of Belgian Research

WHILE most of the papers at the International Gas Conference in London last week were devoted to aspects of gas engineering, some were of particular interest to chemists.

In his contribution on "Some Aspects of the Chemical Valorisation of Coal Gases in Belgium," Dr. Paul Ferrero opened by reviewing briefly work on the isolation and use of the hydrogen of coke oven gas. While it was natural to think first of this component—which constituted 55-60 per cent of the coke oven gas—the next stage was to consider the hydrocarbons, representing 25-30 per cent.

Ethylene Isolation

At a later stage still, interest was aroused in the olefin content. Although this represented only 2 per cent available from the original coke oven gas, one of the fractions obtained in simple fractionation of the latter contained 20-25 per cent olefins. This fraction could then be rectified under pressure permitting the isolation of ethylene at any desired degree of purity.

The most promising of the derivatives of ethylene from this source—taking into account quantities, cost and purity—were those based on ethylene oxide, for the preparation of which the following process had been successfully used in Belgium since 1936.

Starting directly from ethylene, water and chlorine without a catalyst, secondary reactions forming dichlorethane, were reduced to a minimum.

The ethylene was finely dispersed in the reaction column in a solution of hypochlorous acid, the concentration of the latter being maintained by the addition of chlorine to the solution. Then

$$Cl_2 + H_2O \rightarrow HOCl + HCl$$
$$\text{and } HOCl + C_2H_4 \rightarrow CH_2Cl.CH_2OH$$

with yields of 89 per cent of chlorhydrin. Reaction of the resultant solution with milk of lime yielded ethylene oxide according to the equation

$$2\ CH_2OH \quad CH_2 \quad O \quad + Ca(OH)_2 = 2 \qquad + CaCl_2 + H_2O$$
$$CH_2Cl \quad CH_2$$

This mixture was heated to 90° C. by live steam and the ethylene oxide distilled off.

Most important of the derivatives were considered to be the glycols. Addition of one molecule of water yielded ethylene glycol.

$$CH_2 \quad CH_2OH \quad O \quad + H_2O = \qquad CH_2 \quad CH_2OH$$

but in practice it was difficult to avoid the formation of di- and tri-glycols, via the stage

$$O \quad CH_2\ CH_2OH \quad CH_2\ CH_2OH$$

If the ethylene oxide was reacted with alcohol instead of water, the monoalkylglycols were obtained; if with fatty acids, surface active agents. With hydrogen sulphide thiodiglycol was produced. Reaction with ammonia yielded the ethanolamines.

It was also possible to prepare ethylbenzene by condensation with benzene; this might then be dehydrogenated to styrene and this, in turn, reacted and polymerised to styrol resins.

Dr. Hs. Deringer, director of the gas undertaking of Winterthour, described a new scheme for the absorption and recovery of carbon monoxide in town gas.

Detoxification

The doctor's researches had been built round the observation that certain salts added as crystals to a neutral solution of cuprous chloride aided absorption of carbon monoxide. These crystals reacted with the complexes CuCl—CO—H_2O which were initially formed and yielded new solid phases of which the sorption pressure was lower for a given charge of carbon monoxide. The kinetics of these reactions had been studied and, from them, the volume necessary for washing out the CO had been calculated. For a detoxification project for 1000 m^3 of gas per hour at Winterthour, a two-stage absorption installation was being erected with a gas capacity of the washers of 50 m^3, that is to say a total capacity of 75 m^3.

The complexes produced were decomposed in two stages under vacuum, thus permitting the CO to be recovered.

Oxidation of the absorbent was not serious, despite the fact that town gas contained several per cent of oxygen,

(continued at foot of page 10)

THE "HOT" LABORATORY AT HARWELL

Elaborate Safeguards in Separating Fission Products

ONE wing of the new radiochemical laboratory at the Atomic Energy Research Establishment at Harwell, Berkshire, is now ready, and scientists are to begin work there almost immediately.

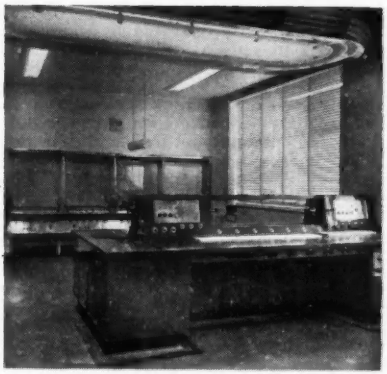
This was announced last week by the Ministry of Supply, which states that the building is the most complicated project of its kind undertaken on this side of the Atlantic.

Scientists will be tackling one of the most difficult problems in the atomic energy programme—that of research on the chemical separation of the fissile element plutonium from uranium rods in a pile. The rods contain very radioactive "fission products" and it is this chemical separation that presents the greatest difficulties.

The laboratory will also be used for other chemical work with radioactive materials, including the separation of radioisotopes produced in BEPO (British Experimental Pile), and processing materials that have been irradiated in the pile.

The type of work to be carried on in the laboratory involves new problems—particularly regarding the health and safety of the worker and the control of any active material in dust, gases or effluent.

The building is designed to provide every facility for working with "hot" (radioactive) materials. In the centre of the ground floor is the administrative block, which consists of offices, laboratories, stores, and workshops.



The keynote of this typical laboratory is provided by the precautionary devices, special air inlets and air ionisation chamber above the work bench, lead lined cupboards and a monitor above the fume cupboards

Connected with it by air locks are two wings. These house the "hot" laboratories. In the first floor, which is windowless, and the tower is a complex system that carries the main services and air ducts to a special ventilating plant. The operation of these is supervised in a central control room, and there is a reserve equipment to deal with any failure.

The radiochemical laboratory building, a large part of which (the windowless first floor) is given over to complex services and ventilation, for which the square central tower serves as the exhaust

A hospital finish is used throughout the building and corners are rounded. Changing rooms and showers are provided for staff entering or leaving "hot" areas, and foot-operated wash basins, with air-driers, are situated outside each laboratory group. Doors in "hot" area corridors are automatically operated by photo-electric cells to reduce still further the risk of contamination from the hands. Equipment for "monitoring" hands, clothing and body—that is to say, checking for radioactivity—is provided at washing places and an automatic monitoring system "checks" people leaving the building.

Active dust and fumes from the chemical processes are a possible airborne danger to health; the extraction system deals with this problem, while strict cleanliness minimises the dust. Dust-free air is admitted, and its flow, at the maximum rate of some 360,000 cu. ft. per min. is distributed so as to extract any active dust and fumes.

This maximum rate of flow is equivalent to 120 complete air changes per minute in a laboratory. Under normal conditions, however, the rate will not exceed 40 changes per minute.

Any active solids removed in this way are retained by precipitators so that the exhaust air leaving the central square tower is harmless. Similarly, all effluent through the drainage systems is segregated and monitored before final disposal.

Work with active materials will usually be carried out in ventilated fume cupboards where remote control of processes from behind walls of interlocking lead bricks may be used. Separate concrete-surrounded rooms are provided for work with highly radioactive materials.

All laboratories are continuously monitored so that the staff may know the amount of radiation to which they are exposed. Fire alarm and alarms for radioactivity risks are provided throughout, and the location of an alarm signal is recorded centrally.

CHEMICAL DERIVATIVES OF COAL GASES

(*continued from page 8*)

because the rate of oxidation was about $\frac{1}{200}$ that of the rate of absorption of CO.

The small portion that became oxidised was readily reduced by treatment with metallic copper in accordance with well-known practice.

Beause of the respective positions of copper and of iron in the electrometric series of elements ($Cu \rightarrow Cu^{\cdot\cdot} + 0.345$ v.; $Fe \rightarrow Fe^{\cdot\cdot} + 0.440$ v.), contact of the absorbent with metals less noble than copper was avoided.

Fresh Ground

These studies covered entirely fresh ground, since previous work on cuprous chloride as absorbent had been on ammoniacal cuprous chloride and the cupramines used in the synthesis of ammonia.

The national reports on researches in various countries included references to chemical projects.

That on research in the British gas industry by Dr. J. G. King included reference to synthesis of methane. A major programme was devoted to study of a one-stage process of gasification of bituminous coal in steam and oxygen bringing about synthesis of methane.

One research team was devoted to fundamental work on gas separation by refrigeration. A new process for removal of organic sulphur compounds from coal gas employed molybdenum sulphide as a hydrolysis catalyst in the presence of hydrogen sulphide and water vapour. The work also included researches on effluent treatment to remove harmful components.

Water Gas

Researches in the U.S.A. reported by the American Gas Association had led to working plants for catalytic re-forming of hydrocarbon vapours with steam. In this work, concentration had been centred on the production of water gas which avoided the formation of tar products and condensibles. Its report, not yet elaborated, was that the industry might one day emerge as a basic chemical industry with heat supply as a by-product.

The organisation of the Gas Research Centre of France, reported by Prof. G. Ribaud, director of studies at the Centre, included divisions devoted to chemical researches and coal tar derivatives. The latter had departments investigating benzols, phenols, paints and rubber, and agricultural products.

Pipe Protection

A corrosion service for the protection of gas installations had existed since the beginning of the research organisation. Much of its work had, of course, been electrochemical, being concerned with the protection of pipes from parasitic electric currents by the use of cathodic protection and of magnesium as a sacrificial anode.

MOBILE LABORATORY UNITS

Making Full Use of Available Equipment

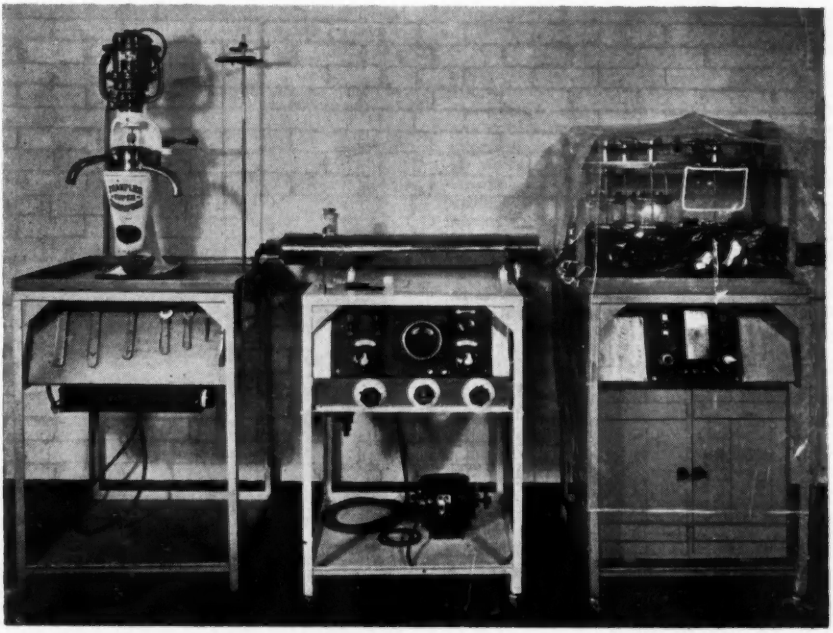
A RECURRING problem in a laboratory engaged on routine testing is the maintenance of permanent equipment in such a way that it is always available for immediate use, although it may not be needed for days on end. Valuable bench space is often tied up, or else the apparatus is dismantled and stored away after use, so that it takes a considerable time to locate component parts and more time is wasted in re-erection and adjustment.

Esso European Laboratories claim to have solved this problem in such a way that not only are the original troubles relieved but the availability of the apparatus which has to be shared by groups of workers is increased.

A trolley of uniform size was developed. The units comprising it consist essentially of a two-foot square flush metal top standing 3 ft. from the ground. This is supported by four angle legs mounted on castor wheels. A lower tray is fitted just above the level of the castors. Upon one of these trolleys the whole of any desired unit of apparatus is then mounted. The aim is not only to include the basic apparatus but also to provide storage for glassware and test specimens as well as complete tool racks where necessary.

The general principle was well applied by the method of adapting a BSI sludge apparatus to this unit construction. In this, the top platform supports an electrically heated oil bath fitted with stirrers, cooling water connection and drain manifolds.

Behind the bath a perspex panel supports the flowmeters. The capillary tubes are at right angles to the flowmeter U-tubes, thus being directed towards the pressure compensating tubes fastened to the sheet metal back plate. Above the



Three typical assemblies on trolleys, of which the one on the right, not for immediate use, is protected by a plastic hood

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flowmeters are the air supply needle valves for each sludging unit.

In the front face of the trolley the electrical control panel is fitted, with the stirrer motor immediately behind it on a sub-staging. The normal air cleaning train is fitted on the lower tray of the trolley, being supplied *via* the main air supply pressure compensating tube fitted against one of the rear support legs of the trolley.

Storage for six complete sets of glassware for use in this test is provided in a compartment closed by a door on the right of the apparatus.

The following apparatus and equipment have already been successfully adapted to trolley units: Air Ministry oxidation test, Sunbury beaker corrosion test; BSI sludge, Ramsbottom coke, Navy heater test, and a Sharples laboratory centrifuge.

The great advantage of this method is that it is now possible to have any of this apparatus operating in any part of a laboratory at a few minutes' notice. When not in use the trolleys are kept in a store room under a plastic dust hood (as shown). This keeps the apparatus in a clean working condition even if stored for several weeks.

The idea is proving very successful and is likely to be developed further at Esso European Laboratories.

Automatic Alarm Lessens Explosion Risks

Continuous Gas Analysis Method in the U.S.A.

A FULLY automatic method of lessening combustion and explosion risks in plants where easily ignitable gases may be released has been reported in the U.S.A. It has passed the exacting tests of the Underwriters' Laboratories, Inc., an independent standards organisation, and is the first mechanical gas detector to do so.

The Lor-Ann Combustible Gas Detector, made by a firm in New Jersey, continually samples and analyses plant atmosphere where combustible gas accumulations constantly represent a hidden fire or explosive hazard. When gas accumulation approaches a dangerous volume, an automatic alarm, both audible (bell and/or siren) and visible (neon signal light) is given and at the same time the instrument automatically takes over control of the plant's operating machinery and either the fire-fighting or ventilation system or both, depending upon the particular protection requirements.

Complete Unit

The controller of the gas detector is contained in an air-tight and dust-proof cabinet mounted on a self-supporting steel panel, which also houses a heavy duty, rotary vane, suction pump from which tubing leads to the gas analysis cells or "remote heads" which are placed at danger points. The remote heads are designed to be placed at any distance from the main control panel, the analysis taking place in the gaseous area, the result being instantaneously "telegraphed" to the control panel.

The alarm point setting is variable and can be set from 20 to 100 per cent of the lower explosive limit for any given gas. A wide-faced meter gives a constant reading of gas concentrations. In addition to the automatic gas warning signals, the detector is fitted with a separate fool-proof signalling system to indicate both visibly and audibly any failure of the instrument to operate.

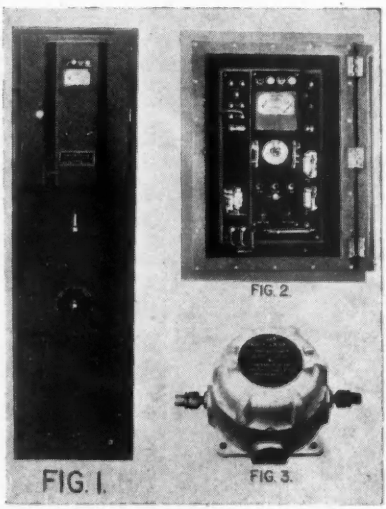


Fig. 1 shows the whole assembly; Fig. 2 is the interior of the control mechanism and Fig. 3 the sampling and analysing head

STRONG IMPERVIOUS CRUCIBLES

U.S. Claims for Better Structure and Lining

CLAY crucibles possessing properties that make them particularly suitable for smelting high-lead glazes and enamels, materials that are especially corrosive to ordinary clay crucibles, have resulted from two recent developments at the U.S. National Bureau of Standards.

One of these, a new composition for the body of the crucible, gives an improved structure. The other, an additional step in the procedure for lining crucibles, aids in sealing invisible cracks in the lining.

Resistant to Molten Fluids

The usual clay crucible is quite porous and therefore subject to penetration and attack by highly corrosive melts. By contrast, the pores in the new crucible are very small and the interconnecting passages between them so minute that they effectively resist the flow of molten fluids.

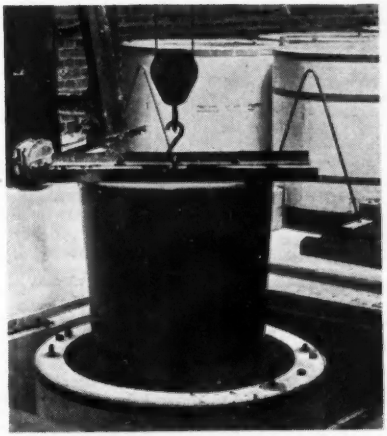
The manufacture of high-quality glass calls for pots or crucibles that will resist attack from the molten glass and that will not introduce impurities through interaction with the glass. To meet the exacting requirements peculiar to the production of optical glass, the refractories laboratory at the Bureau has for over 20 years been engaged in research on refractory clay pots, techniques for their manufacture, and special compositions for particular applications.

All the pots used by the bureau's optical glass plant have been manufactured by the refractories laboratory. Observations of the performance of pots in the plant have afforded an exceptional opportunity for the study and correction of defects in pot structure, and have led to improvements in the quality of the glass.

Slip Casting Method

For most glasses produced, two types of pots have generally been satisfactory. One, containing a dense low-porosity lining, has been used for manufacture of the more corrosive glasses, the other without a lining for those less corrosive.

Several individual procedures developed at the bureau are followed in the manufacture of these pots. The technique of slip casting, first reported nearly 30 years ago, is used exclusively in preference to hand moulding methods. In this method, the clay casting slip—the mixture of dry ingredients with the proper amount of deflocculants and water to give good flow characteristics—is poured into plaster-of-paris moulds, consisting of two parts, a shell and a core that is locked in position before the pot is cast. During the initial stage of casting, the mould is slightly tilted to lessen the tendency to entrap air bubbles between the lining and the pot. After the bottom is filled, the mould is levelled and rocked lightly until the pot is completely cast. Rocking serves the dual purpose of levelling the slip as it is cast and of freeing the air trapped in the slip during the casting operation.



After the core has been lightly scraped to remove surplus slip, it is lowered into the shell of the mould, where the crucible is cast round the lining

Lining of the pots is in effect applied before the pots are cast. In other words, the lining slip is first poured around the core of the mould, which is removed and transferred to the shell. The pot is then cast in the same manner as for unlined pots. Double and triple layers of lining, up to a total thickness of $\frac{1}{4}$ in. or more, are sometimes applied.

The additional step that has recently been introduced for lining crucibles consists in spraying a coat or coats of clay slip over the lining to seal incipient cracks. Such faults often open during

(*Continued at foot of following page*)

Improved Metal Comparators

The new test head comparator in use

WIDER application and utility has been conferred on the G-E metals comparator by a new test head developed by the (U.S.) General Electric Company's special products division. For use on flat surfaces, particularly of large equipment, the new test head was designed for those instances in which the conventional test unit, the test coil, is inapplicable.

By comparing ferrous or non-ferrous metal parts with a known standard, the metals comparator provides a quick, non-destructive test of the quality of the parts.

The equipment consists of an electronic unit mounted in a steel cabinet and a test unit; either a coil for small metal parts or the new test head. The electronic unit includes a balancing network, oscillator, and indicator. The new test head has a contact surface consisting of a ring separated from a concentric core by an air gap, whereby a radial magnetic path is formed across which the test piece is placed. Three inches long, it is produced in various face diameters.

The device is basically an impedence comparator. The impedence of a test unit will vary with the electrical and magnetic properties of the specimen being tested. Through the use of standard or reference specimens changes in the chemical and physical properties are correlated with the electrical and magnetic properties.

STRONG IMPERVIOUS CRUCIBLES

(Continued from previous page)

use and permit a fluid glass or glaze to penetrate into the walls or, in some instances, to leak through the crucible.

The cores are removed as soon as practicable after casting in order to prevent cracking of the lining—timing of this operation is critical—and the shells are removed when the pots have set sufficiently to retain their shape. The pots are then air-dried and, finally, immediately before use, are heated to approximately the temperature of the melt they are to contain. A carefully regulated heating schedule has to be followed and the rise in temperature controlled in accordance with the relative speed with which the pot can be heated through certain ranges without damage.

Corrosion Resistance

The new crucible composition orginally developed for highly corrosive glasses, possesses several desirable properties in addition to its unusual pore structure. It has low gas permeability, even though it shows a porosity of 22 per cent after firing at 1435°C. Crucibles of this composition have somewhat lower resistance to thermal shock, but considerably greater resistance to corrosion.

Crucibles are finished by cutting surplus material from the rim (foreground); stirring thimbles (centre background) are cast of the same material as the crucibles and coated with lining slip

INDUSTRIAL USES OF ITACONIC ACID

Its Application in the Manufacture of Alkyd Resins

BY A SPECIAL CORRESPONDENT

ITACONIC acid has long been known to students of organic chemistry as one of the three isomeric acids obtained by heating citric acid, the others being aconitic acid and itaconic anhydride.

It is only within the last few years that itaconic acid has assumed importance as an industrial chemical, and with the development of new and economical methods of manufacture, some of which are based on vegetative fermentation, there is a growing interest in its potentialities for the production of alkyd resins and unsaturated polyesters.

This unsaturated dibasic acid is odourless, non-toxic, and available as a white crystalline non-hygroscopic powder. It has a relatively low solubility in cold water but dissolves more readily as the temperature of the water increases; thus at 20° C. the solubility is 8.3 gm./100 ml. and at 80° C. 72.5 gm./100 ml.

Solubility in organic solvents, including the paraffin hydrocarbons, is very limited, but in the more polar types of solvents, such as the lower ketones and alcohols, the acid is moderately soluble. Like other dibasic acids, such as maleic and fumaric, itaconic acid undergoes the usual reactions forming salts, acid salts, amides and esters. It is the last named which are now assuming the most importance.

The most interesting and important application of itaconic acid is in the manufacture of alkyd resins where the replacement by this acid of some of the phthalic anhydride (10-15 per cent) results in certain improvements.

Phthalic Acid Replacement

Normally, phthalic anhydride is reacted with alcohols, such as glycerol, pentaerythritol and glycols, the resins being modified with the oxidising oils and acid for fast drying paints and enamels, or non-oxidising oils and acids for baking enamels Itaconic acid cannot be used to replace the phthalic anhydride entirely, as is the case with maleic acid which produces a varnish type of coating, but it enables a better quality alkyd coating resin to be made. The principal advantages which may be claimed for this addition can be summarised as follows

(1) The reaction time is shortened and so enables a larger output per plant to be maintained.

(2) Harder finishes can be obtained by the introduction of itaconic acid into the resin than is possible with pure phthalic alkyds.

(3) The colour of the baked or air dried coating is improved.

(4) Baking time is reduced.

(5) The percentage of itaconic acid present in the alkyd can be raised without increasing the viscosity of the resin. Indeed, it is considered by some manufacturers that one disadvantage of the use of this acid is that it tends to lower the viscosity of the resin.

Itaconic acid modified alkyds are suitable for use in the preparation of alkyd coatings for spraying, dipping, brushing, roller coating and knife coating.

New Contact Resins

The linear condensation polymers made by reacting itaconic acid with glycols offer promise as new contact resins. They are very versatile and may be used by themselves or copolymerised with monomers such as vinyl acetate or styrene.

The less known esters are dimethyl, diethyl and dibutyl itaconate, but recently diallyl itaconate has been produced in commercial quantities. All these compounds are monomers which can be converted into polymers ranging from viscose, colourless liquids to crystalline solids. Both as resins or constituents of commercial resins, and as plasticisers, adhesives and coatings, the itaconates are attracting attention.

Copolymers can be formed by reacting the esters with other monomers, *e.g.*, styrene, methyl methacrylate, etc., in the presence of per-oxygenated catalysts. By reacting polymeric itaconates with monomers, methyl methacrylate, for example, can be polymerised with a polymeric dimethyl itaconate to produce a crystal-clear transparent resin possessing low mould shrinkage, high Rockwell hardness and good resistance to abrasion.

Preliminary experiments indicate that the itaconic esters may assume importance for permanently modifying the properties of the more familiar resins, improving the colour, and increasing hardness and abrasion resistance. In the formulation of adhesives, polymeric itaconic esters are of considerable interest, and the use of dimethyl itaconate for making cements has already been patented.

PRODUCTION AND USE OF OZONE

Employment in Italian Oil, Fat, and Varnish Processing

From AN ITALIAN CORRESPONDENT

THE availability of cheap electricity in those parts of Italy where water power is abundant, has encouraged its use in a number of industries, including those connected with oils, fats, and varnishes, where it has been introduced for the production of ozone (O_3). The old method of production, based on mechanical agitation, has been superseded wherever possible by mixing the different preparation baths in an atmosphere which has been subjected to pressure or aspiration.

Ozonised air has been found to be more effective than ordinary air in these processes, because it exercises, among other things, a more powerful chemical deodorising, decolorising and purifying action, and avoids the necessity of using the chemical products which were at one time indispensable for preparing some widely used edible and industrial products, excepting those which are necessary for neutralising acidity.

Sterilising Properties

For best results with ozonised air, it is important, of course, to have an electric plant with special application to the production of ozone, also the most suitable conditions for securing the maximum action of the gas. In Italy the "Indo" electric plant for producing ozone is the most generally used in the oil, fat and varnish works, and through its use a fairly simple, rapid and economical treatment of the different raw materials can be secured, the deodorised, decolorised and purified products turned out being of better quality than those still obtained by the ordinary processes.

In most of these works the gas is utilised to the fullest advantage. The "Indo" plant also produces with the ozone nitrogen peroxide which is found to be of great assistance in bleaching, deodorising and sterilising. This is very important as many of the chemical reagents which might be used for assisting the natural oxidation of oils and fats have undesirable properties, and some are even poisonous.

Ozone (allotropic oxygen) has an oxidising power many times greater than that of ordinary oxygen, as it replaces this during a gradual decomposition process with nascent oxygen. This explains the impressive results obtained with ozone without damaging the raw materials treated, or leaving harmful traces in the new products obtained, which acquire very useful properties not often possessed by those obtained entirely by chemical means.

Ozone destroys, besides other impurities, all natural colouring matters and those due to ageing, without altering the quality and characteristics of the oils and fats themselves. The disagreeable smell of many substances, caused chiefly by decomposing organic matters, is eliminated, as ozone oxidises and sterilises such substances, arresting their decomposition and removing the cause. Also the oil is sterilised against bacteria coming from contact with the air or through other reasons.

Varied Uses

In the refining process of some raw materials a natural fluorescence and any disagreeable taste is removed, and the final products can be used for edible purposes. Ozone finds, in consequence, a very satisfactory use in the depuration and improvement of vegetable and animal oils and fats. It is also useful for illumination products, for improving paraffin wax, mineral oils, petroleum jelly, and drying oils, in the production of varnishes and lakes, and in the bleaching of coloured natural waxes, etc.

During the treatment of the oils there is a certain thickening; with lubricating oils, ozonisation increases the viscosity. Fish, recovered vegetable and animal oils, and mineral oils, are bleached and deodorised, being transformed into suitable products for soap making and other industrial purposes, such as margarine manufacture, etc. Fish oils and fats become decolorised and deodorised even after a few hours' treatment.

Soaps

Shale oils are transformed into saponifiable oils and fats; bone grease is completely deodorised and bleached. Ozone depurates and improves colza oils which are intended for illumination. Blue resin oils lose their fluorescence. The disagreeable smell due to toluene is reduced, and with a stream of ozonised air it is possible to activate energetically the production of certain soaps.

With ozone, edible oils have been found to acquire greater softness, a better taste and, through sterilisation, a greater degree of preservation. Low quality olive oils are improved to a marked extent, as it is possible, with ozone, to eliminate the dis-

agreeable earthy and rancid taste. Other low quality edible oils can be completely decolorised, and the products obtained may be used for producing soaps of superior quality and for various other industrial purposes.

Black and dark oleins become light, or assume a reddish yellow or orange colour, according to their type or the mixture of oils they contain. The density of decolorised products is increased and they saponify better. Oils for soap-making with any acidity can be advantageously treated. The bleached oils do not require any other treatment, and any residues in them are also decolorised. All the oils treated are transparent and have the appearance of having been filtered. They can be coloured to any shade that may be necessary.

With linseed oil, the drying process usually adopted is in reality one of oxidation. The great industrial importance of ozone in this process, therefore, is apparent.

Very good results are obtained in the purification of oils and solid fats by warming them electrically or with steam while they are traversed by a stream of ozonised air, using the apparatus for the oxidation of linseed oils which are to be made into varnishes. Here the yield can be easily increased by introducing ozonised air in the place of ordinary air. In this case ozone not only deodorises and decolorises, but also transforms certain oils rapidly into clear varnishes of superior quality.

The treatment is of great utility in the production of linoleum and related products. The fat lakes of colophony can be quickly hardened and rendered clear through ozonised air. The ozone, besides accelerating the clearing of the fat lakes, brings about their ageing and a rapid depuration.

In all the instances cited, the ozonification process is of very great commercial value. Its cost is much below that of most ordinary chemical processes and the results are more advantageous. In a few processes using ozone the cost may be higher. They are, however, always quicker. With certain raw materials, the results aimed at can only be achieved with ozone.

Prospective Yields of Linseed Waste

Progress Towards Recovery of Industrial Fibres and Wax

THE prospect of more profitable development of the home grown linseed industry in the United Kingdom is being brought nearer by co-ordinated research from several differing angles aimed at finding profitable uses for the by-products. This is the subject of a summary issued by the Department of Scientific and Industrial Research, which has been working on this investigation in collaboration with research associations, universities and Government departments. The subject is treated fairly fully in the DSIR exhibit at the contemporary Nottingham Quincentenary Trades Exhibition.

One interesting aspect of such recovery is the possibility of extracting a wax, in addition to the fibre products.

The DSIR announcement discloses that more than 200,000 tons of linseed straw was produced here in 1948. Most of this was waste material, to be disposed of only by burning, for it takes several years to rot down under normal conditions. Investigation has ascertained that the straw, or its products, can be used in the paper, board, and linoleum industries, and a wax has been extracted from it. The fibre has been found to be a good substitute for jute.

The growing of linseed in Britain has been greatly increased in the last year or two because of the shortage of linseed oil. In 1948 the 86,000 acres producing linseed yielded about 2½ tons of straw per acre.

There are three residual materials that might be made use of—the whole straw, the fibre, and the "shives," or woody part. All three can be utilised.

The whole straw can be used for making building board, paper, carboard and packing and insulating materials. A wax has been extracted from the straw which may prove commercially attractive. The wax can also be extracted from the fibre, shives, and the dust arising from processing the straw.

The fibre produced from the whole straw can be spun as a textile and both the long line fibre and the shorter tow have been spun successfully on existing jute machinery. The resulting yarn has a strength compared with jute yarn of nearly 75 per cent. Jute, all of which has to be imported, now costs five times as much as it did before the war.

A powder made by grinding the shives has been used experimentally to make linoleum, replacing the wood flour which at present forms the filler. The shives, bonded with plastic, also make building board, and can be burned as a fuel.

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AMERICAN CHEMICAL NOTEBOOK

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FROM OUR NEW YORK CORRESPONDENT

COLD fog can now be dispersed by the same "seeding" techniques scientists use to convert clouds into rain and snow, according to Dr. Vincent J. Schaefer, of the General Electric Research Laboratory, Schenectady, New York, who is a pioneer in the modern attempts at weather control. Scattering small quantities of dry ice or similar particles in a supercooled ground fog will cause the water droplets to gather into ice crystals so heavy that they can no longer remain airborne, he says. In warm weather the ice crystals melt as they descend to the earth and turn into rain. "It would be foolish to think that such results can be obtained immediately," the doctor states. Many careful quantitative research experiments must be conducted before eventual success in this field can be expected.

* * *

The U.S. Department of Justice has announced that the patent relating to the German-developed Lowenstein-Fiedel process of producing hydrogen peroxide is now available for licensing from the Office of Alien Property on a royalty-free non-exclusive basis. The technical data regarded as essential in the operation of the process is also available though not part of the patent. The process was originally developed in Germany and was the property of J. D. Riedel de Haen, a German firm, until it was seized by the United States during the war. The unpatented information essential to the process was, until recently, licensed to two American companies by the German firm. By their licensing agreements these firms were bound not to disclose the information until March 28, 1949, when the basic patent covering the process expired. Patent No. 1,937,682, the one now being offered by the Office of Alien Property, is an improvement on the basic patent. Information necessary for its operation is contained in an exhaustive report. A copy of this patent (an improvement over patent No. 1,851,961, which has now expired) may be purchased for 25c. from the Commissioner of Patents, Washington 25, D.C.

* * *

Plans for the future production of uranium are expected to form the basis of discussions between the U.S.A., the United Kingdom and South Africa, according to the U.S. Atomic Energy Commission. Informal discussions, which the two countries have had with the Union of South Africa over a period of years, have been confined to the problems involved in producing uranium occurring in the South African gold ores. In the proposed discussions, the commission announces, it is expected that representatives of America and Great Britain will visit South Africa, at the invitation of the Union Government, to give further consideration to these matters.

* * *

The Economic Co-operation Administration has announced the signing of an industrial guaranty contract with the Metallising Engineering Company, Inc., of Long Island City, New York, which is planning a $45,000 investment in the United Kingdom. Metallising Engineering is a manufacturer and supplier of equipment and materials for metal spraying in the repair and salvage of industrial machinery. It will soon start production and distribution operations with a British associate at Chobham, Surrey. The American firm has been exporting to England and other countries for a number of years. Its business in Great Britain is expected to total about $400,000 yearly when peak production is reached in about three years. Of this amount, about one-half is to be exported from the U.K. to nations outside the dollar areas. The contract was executed by the Export-Import Bank, Washington, and is one of a series designed to encourage American industry to invest dollars that will assist European recovery. The contract assures conversion of foreign currency receipts into dollars, up to the amount of the dollars invested.

* * *

A new gas-treating plant to extract hydrogen sulphide from the natural gas from wells operated by the Pure Oil Company, and a sulphur recovery plant to reduce the hydrogen sulphide to elemental sulphur are being erected by the Texas Gulf Sulphur Company at Worland Dome, Washakie County, Wyoming. Extraction of the hydrogen sulphide from the natural gas will be by the Girbotol process developed by the Girdler Corporation, which is the general contractor for the new project, supplying the engineering, design and all the equipment.

Metallurgical Section

Published the first Saturday in the month

Silver can handle bromine

Silver is the only metal suitable for the construction of certain types of equipment, which has good resistance to bromine and its compounds. The diaphragm-sealed needle valve illustrated is used for handling liquid bromine. All parts in contact with the fluid are of pure silver : the operating mechanism is completely sealed. It is available in a range of standard sizes up to ¾ inch bore.

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Metallurgical Section

2 July 1949

WORLD TIN SURPLUSES

International Tin Group Seeks Regulation

AS an example of the rapidity with which a widespread post-war shortage can be converted into a surplus the record of world production and use of tin may be unique. This is evidenced by the fact that one of the subjects receiving most attention from the International Tin Study Group at its meetings in London last week was the setting up of machinery by which world production and use might be more closely related and the effects of over production mitigated.

The fourth meeting of the group, of which Mr. W. G. Fergusson was elected chairman, was attended by representatives of Australia, Belgium, Bolivia, British Colonial and Dependent Territories, Canada, China, Czechoslovakia, France, India, Italy, Netherlands, Thailand, United Kingdom, and the U.S.A. Observers from the United Nations, the Organisation for European Economic Co-operation and the Tin Research Institute also attended.

The imminence of the prospect of severe over production of tin was foreseen in estimates prepared by the group of future world output and consumption. They were as follows:—

	Production Tons	*Use Tons	*Excess production
1949 ...	170,000	138,000	32,000
1950 ...	190,000	158,000	32,000
1951 ...	205,000	162,000	43,000

*Commercial purposes.

It was recognised that these forecasts were subject to many modifying factors and that they did not make allowance of stockpiling purchases (by the U.S.A.), which are in any case an uncertain quantity.

The group reported that: "The estimates indicated an existing and growing excess of production over commercial consumption, but took no account of purchases for non-commercial purposes. The group had insufficient information before them to enable them to say to what extent and for what period of time such purchases would be effective in averting disequilibrium. They did, however, understand that there was a reasonable prospect that such purchases might maintain an equilibrium for an appreciable period ahead.

"They were unable to determine how long this period might be, but considered that a burdensome surplus of the kind which can be regarded as justifying the conclusion of an International Commodity Control Agreement might well arise within the next five years."

The most important decision by the group was to establish a working party to review tin industry prospects, and to draft a commodity control agreement which, if acceptable to all members, could go before an International Commodity Conference convened by the United Nations.

The urgency of some form of international regulation, in the view of the tin producers, is reflected by the fact that the working party has been asked to report within three months, if possible.

Reports from all world centres of production indicate there has been substantial limitation of tin concentrates, tin metal and tin plate, which was particularly evident in March and is not likely to have been reversed since then.

THE American Zinc Institute has just published a 64-pp. booklet, "The Zinc Industry," which gives an interesting and informative outline of zinc from mine to market. It points out that the work is not intended as a technical treatise, but deals with production and consumption in sufficient detail to give those interested a wide picture of the zinc industry in America and elsewhere. The text is illustrated and up to date. Copies are being sent without charge by the American Zinc Institute, Inc., 60 East 42nd Street, New York 17, N.Y.

Price Prospects in Lead Industries

U.S. View on Recent Declines

SOME of the factors which influenced the spectacular recent falls in the price of lead in the U.S.A.—and indirectly the price in this country—were reviewed last week by Mr. Robert Lindley Ziegfeld, secretary of the Lead Industries Association, New York, in an address to a meeting of the Idaho Mining Association. He predicted a return to normal marketing and buying operations and in general painted an optimistic picture for the remainder of the year, with certain exceptions.

There appeared to be a promising outlet for lead in battery manufacture, the industry estimating that during the last six months of 1949 it will produce some 12 million batteries. It was noteworthy that the weight of lead per battery had been increasing in the last few years, having risen from about 22 lb. to about 27 lb.

Optimism also centred about the consuming potentialities of the tetraethyl lead industry, which had grown from nothing a little over 20 years ago to a lead consumption of about 80,000 tons per year. Further growth was expected in this connection through the use of more cars and higher compression engines. It had been estimated that the use of tetraethyl lead might more than double in the next five years.

The recently announced reductions in the price of lead were expected to result in its increased use in cable sheathing, building construction, water distribution and plumbing, and in chemical construction, where lead was employed to fabricate corrosion resistant equipment. There was no doubt that considerable chemical construction was being held in abeyance until costs and business generally showed signs of stabilising. Lower prices for lead should help to some extent competitively.

Mr. Ziegfeld stressed that U.S. Government stockpiling of lead had accounted for substantial quantities of the metal since the stockpiling programme got under way, and it was expected that sizeable purchases would be made by the Government in the new fiscal year starting July 1.

Referring to the recent fluctuations which, he said, had ended in the most precipitous price drop of lead in history, Mr. Ziegfeld recalled that the end of the war had brought a " terrific " demand for lead products, since the public had been unable to buy many of the things they needed and wanted. Huge consumption of lead in the years following the war finally caught up with the filling of this demand, and when dealers' and manufacturers' shelves were filled with lead products ultimate consumption dropped back to normal, and buying of the raw material—pig lead—virtually stopped. As those inventories of lead products worked off, lead manufacturers were bound to re-enter the market.

X-RAY GAUGING OF STEEL SHEET

USING one of the newer instruments of industry, an X-ray thickness gauge, the Wierton Steel Company, Wierton, West Virginia, reports that it has made possible the production of more uniform steel strip than was possible using mechanical gauges. Installed along the run-out table immediately beyond the finishing stand of the company's 54-in. hot strip mill, the gauge continuously measures the thickness of strip which passes it at the rate of approximately 1700 feet per minute.

It is stated to have enabled workers to reach gauge on the first strip, whereas formerly four strips would go through the mill before a report on the gauge was obtained. This is particularly advantageous when rolling short orders.

The operating department of the steel company states that, because of the gauge, they have been able to adjust the water sprays so that the tail end of the strip is more nearly the same gauge as the front end. This permits better welds on the pickle line, and results in a better product for rolling on the high speed tandem cold strip mills.

As the strip leaves the last of the six finishing stands on its way down the run-out table, it is moving at almost 20 m.p.h. between an X-ray tube located in a steel tank beneath the run-out table and a radiation detector located above the table. It absorbs some of the X-rays passing between these units; the amount of energy absorbed being an indication of its density or thickness.

HIGH-DUTY SILICON IRON

Components of Resistant Chemical Equipment

by R. V. RILEY, Ph.D., B.S.c., A.I.M.*

IRON-silicon alloys containing upwards of 14 per cent silicon have been well known in the chemical industry since the discovery of their excellent acid-resisting qualities by Jouve, a French metallurgist, in 1908. Despite the discovery of stainless steels, high chromium irons, nickel-silicon and nickel-molybdenum alloys and the continued developments in the application of lead, ceramics, fused silica, noble metals and plastics, silicon iron is still favoured as a constructional material for acid plant.

Hitherto in most of the industrial applications, castings of acid resisting silicon-iron have been employed only in a relatively unstressed condition, working either at atmospheric, or at the most, water gauge pressures of not more than a few inches. It may not be generally realised that this alloy can be used under any other conditions. Of recent years, however, owing to the great improvements in its consistency, strength and reliability, silicon-iron is becoming increasingly used for plant working at relatively high temperatures and pressures.

Sulphuric Acid Resistance

From the standpoint of corrosion resistance, silicon iron represents a metal eminently well suited for the manufacture of equipment for sulphuric acid concentrating plant. Throughout two world wars it has stood alone as the most satisfactory commercially available material for this type of acid plant.

Recent developments in chemical engineering have resulted in the production of

Fig. 1

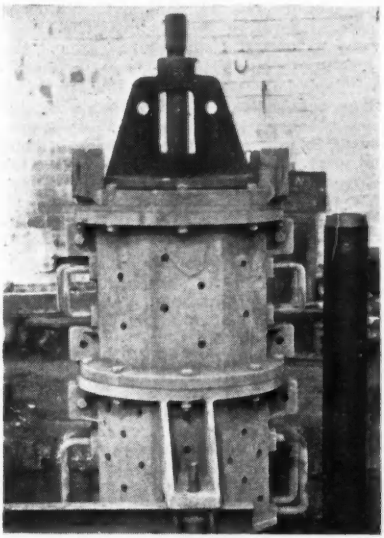

Fig. 2

a new type of sulphuric acid concentrator which makes very severe demands upon the alloy. The Simon Carves group was responsible for the introduction to this country of this plant in which weak sulphuric acid is brought up in strength to 93 per cent under fume-free conditions by means of a vacuum concentrator. The silicon iron parts of these concentrators were produced by Bradley & Foster, Ltd., Darlaston, Staffs., where the various castings were executed in Hypersilid 14-16 per cent alloy.

Heater Tube Castings

A vital part of the concentrator is a heater tube, having a closed end, totally immersed in dilute sulphuric acid and carrying live steam at about 100 p.s.i. Two types of heater tube have been made in silicon iron; the first were 5 ft. long by 7 in. outside diameter, and the second series were 6 ft. long by 7 in. outside diameter.

The finished casting shown in Fig. 1 which is an example of the larger type

* Research Manager, Staveley Iron and Chemical Company, Ltd., Nr. Chesterfield.

of tube, weighed 318 lb. The minimum thickness of this heater tube at any point was $\frac{3}{4}$ in. and maximum was 15/16 in. The variation in wall thickness between any four places at any selected section had not to exceed $\frac{1}{8}$ in., provided none of these measurements fell outside the former limits of thickness. The tolerance on wall thickness for the un-machined sand casting was therefore $\pm$ 1/16 in. The maximum permitted departure from the straight was $\frac{1}{4}$ in. over the 6 ft. length of tube.

The open end of the tube was provided with a flange 11$\frac{1}{2}$ in. diameter and a projecting spigot which terminated in a cone end joint. The flange and jointing section were machined on all faces. Silicon iron is a very hard alloy and the machining of this end was a grinding operation.

Foundry Technique

As it is not permissible to make silicon iron castings with chaplets, the whole of the core for this blind-ended tube had to be located and secured in position from the open end. To work to the desired fine tolerances necessitated special mechanical arrangements to hold the core rigidly in position during casting. The unique moulding box and core assembly shown in Fig. 2, was used. This consisted of a two part box of hexagonal cross-section, having open ends which were accurately squared and machined to provide locating faces for a loose nose end moulding box at one end and the special core barrel collet at the other.

The core was made by loam moulding on a machined core barrel working in machined bearings. The loam board was a fixture. A loose plug of the same diameter as the core barrel served as one of the journals during core making and for handling purposes during stoving. This plug was screwed from the end of the core barrel just prior to setting up in the mould, the hole being made up with loam. Wood wool rope wound on to the core barrel served as a foundation for the loam which was of special consistency calculated to collapse readily after the pouring of the iron.

The moulding box was stood on end in a pit suspended from brackets on the side, leaving 3 ft. clearance at the bottom. The mould was hand rammed around a full length steel pattern located in the collet at the top and a removable ring at the bottom. A natural sand was used, blended to give a dry sand mould having adequate strength when stoved, but being readily collapsible after pouring.

The mould was rammed with the detachable nose box in position. This small box was removed from the mould from underneath to enable the core to be set accurately.

The nose end mould was replaced for casting. The flange and cone contour of the open end of the tube were obtained by means of an oil-sand core which also served as a pouring basin, filling the mould via pencil sprues.

The mould was cast with silicon-iron at a temperature of 1320° C. (optical) and exactly 17 minutes later the core barrel was drawn. The mould was removed from the pit, put on its side on the foundry floor and the box opened, to ease the sand around the flange. The casting was then left to cool slowly in the box.

Each casting was subjected to an extremely thorough and extensive programme of inspection and testing by the manufacturers and a final inspection in the presence of representatives of Simon Carves, Ltd., a boiler insurance company and the customer.

High-Duty Tests

The first inspection of the casting was made before machining by the works inspector. Dimensional checks were carried out, using a specially designed wall thickness measuring machine. The quality of the inside of the tube was then approved by a detailed examination with the Foster Intrascope, an optical device which enables the eye to see every part of the internal surface of the tube, including the closed end. A casting passing this first inspection was then hydraulically tested at 100 lb./sq. in. and approved for machining.

When the grinding of the flange and open end of the tube was finished, the casting was transferred to an acid pickling tank for treatment at 80° C. in 30 per cent sulphuric acid until all effervescence ceased. There followed a final check upon dimensions in the presence of outside inspectors and a pressure test with kerosene under 400 p.s.i. for 30 minutes. No pressure drop under this test was allowed.

Silicon iron for high-duty castings requires very careful preparation. Electric furnace melting of the iron is employed at Bradley & Foster, Ltd. An ingot is made from carefully selected raw materials, refined pig iron, steel scrap and high grade ferro silicon. It is very important to select only raw materials known to be low in hydrogen. The ingot is remelted together with foundry scrap in a 30-cwt. three-phase, direct arc furnace.

The metal for castings must be checked for gassiness before using. This practical test is made by pouring a sampling spoon of molten iron into a prepared sand mould and during solidification its surface is carefully watched for signs of bleeding back.

Hydrogen content of silicon iron must be kept below 2 mls./100 gms. to avoid porosity. It is equally important to prevent the approved iron making contact subsequently with any wet patches on the lip of the ladle or damp runner bushes, and furnace repairs must be carefully dried out before melting silicon iron.

It is important also to keep the carbon content of the iron within the optimum range, which with the Hypersilid alloy, is 0.60 per cent to 0.65 per cent. This ensures the absence of kish inclusions on the one hand and undue shrinkage on the other. For adequate resistance to corrosion, the silicon content is kept about 14.5 per cent. The manganese and phosphorus are 0.6 per cent and 0.2 per cent respectively.

The physical and mechanical properties of Hypersilid alloy are represented in Table 1. It is convenient to compare silicon iron with cast iron and with stone-ware, as all three materials are commonly used in the construction of chemical plant. When the outstanding acid-resisting qualities of silicon iron are considered along with the mechanical properties as revealed in the table, the reason for the success of this alloy in the chemical industry is self-evident.

Chemical plant in which silicon iron can be advantageously used need no longer be limited to low working pressures. (Some typical pieces are shown in Fig. 3.) The silicon iron heater tube using steam at 100 p.s.i., is an established fact. Other plant is known in which satisfactory performance has been obtained under mechanically stressed conditions and there is little doubt that a more widespread use may be contemplated.

TABLE I

PHYSICAL AND MECHANICAL CONSTANTS OF CHEMICAL-WARE

	Hypersilid 14/16	Cast Iron	Stone ware
Weight in pounds per cu. ft.	428	445	136
Density in grams/cu. cm. ...	7.0	7.3	2.2
Melting point, °C. ...	1250	1200	1450
Specific heat	0.130	0.115	0.20
Coefficient of expansion ($\times 10^{-6}$)	12.0	12.1	4.5
Thermal conductivity (cals. per cm. per sec.) ...	0.078	0.110	0.0023
Electrical resistivity (micro-ohms per cu. cm.) ...	50	45	—
Hardness (Brinel) ...	450	180	—
Tensile strength (tons/sq. in.)	10.0	15.0	1.0
Transverse strength (tons/sq. in.)	18.0	30.0	—
Modulus of elasticity (E = lbs./sq. in. $\times 10^{-6}$) ...	17.0	19.0	—

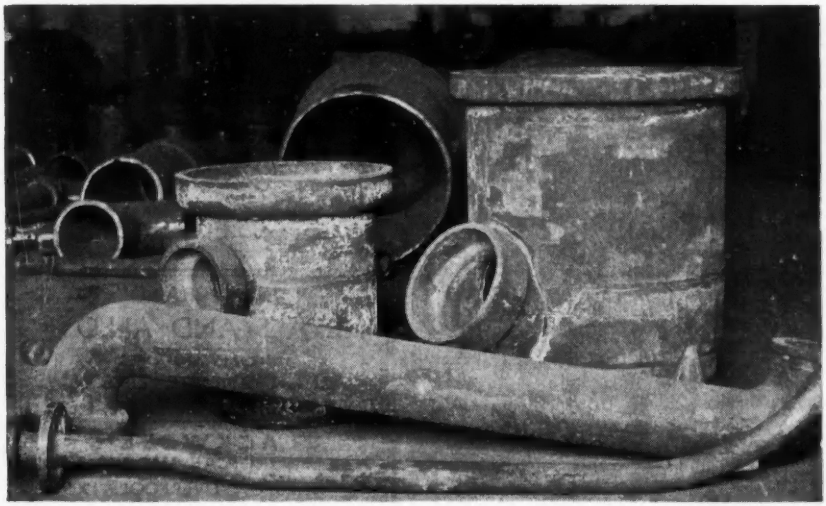

Fig. 3. Some complex castings in acid-resisting silicon iron

Recent Advances in Hard Metal Processes

English Patent Rights Sought

NEW methods for hard metal compositions are the subject of an English patent application by the American Electrometal Corporation, Yonkers, U.S.A.*

The invention relates more particularly to high speed tool elements, not only for machining metals, but also glass, synthetic resins, and laminated material. It has been already suggested to use hard particles of chromium boride with a suitable binder of nickel-chromium-boron alloy, and small additions of iron, silicon, or carbon. The chromium boride could be produced by any well known method, and may be a mixture of such borides. Minute particles of these are used to increase surface area, as is desirable for bonding with the cement or binder, and for reducing brittleness. Average particle sizes between 1 and 20 microns are suitable.

According to the present invention an alloy on metal base of cobalt or nickel is bonded with minute boride particles, preferably of one or more of the chromium borides. It has been found that cobalt can be used as binder if detrimental oxide films have been removed from the borides, *e.g.*, by suitable de-oxidising agents such as molybdenum or tungsten incorporated up to about 1 per cent weight of mixture.

This latter is then heated, preferably in inert atmosphere of argo, or neon, or in vacuum, up to 1000° C. for molybdenum, or 1200°C. for tungsten. The boride powder is thereafter mixed with cobalt (6-20 per cent by weight), cold pressed, and sintered well above m.p. of cobalt; or hot pressed at about 1800°C.

It has further been found that by addition of appreciable amounts of molybdenum, chromium, and/or tungsten to the cobalt, (*e.g.*, from 5-20 per cent of weight of cobalt), the heat and corrosion resistance of the product can be considerably improved. These elements combine, at least partly, in solid solution during sintering at the high temperatures named; and by heat treatment of the sintered or hot pressed body at 1000-1400° C. for a suitable time solid solution formation can be increased.

Some addition of nickel to the cobalt is useful; also, as stated, 5-10 per cent powdered chromium borides to binder, or metallic chromium may be so added, possibly forming an alloy or eutectic between binder material and the powdered borides during sintering under pressure. Iron may be added instead of nickel.

Many advantages are claimed for the use of chromium borides in a mixture with the elements mentioned. Tantalum or columbium (niobium) may be used instead of molybdenum or tungsten; and the compacting pressures recommended are 2000-3000 lb./sq. in.

(Patent Application No. 1883/1947; conv. date 30.7.46.)

Improving Impact Resistance

Better impact resistance in the manufacture of steels, articles and structural elements for use at low temperatures is claimed by the Mond Nickel Co., Ltd., in an English patent application.†

By low temperatures is meant down to about −310°F., as for example in containers for liquefied gases. For such purposes ferritic steel has been generally used, having a high impact resistance. But such steels are only suitable down to about −240° F., resistance drops sharply below that level.

It has now been found and applied in the present invention that the addition of nickel has a marked improving effect. Impact strength varies inversely with nickel content above −240°F.; but below that temperature and especially below −260°F., it varies directly with nickel content, the maximum of which should be 10-15 per cent, with 0.2 per cent carbon. Balance is mainly iron, though silicon up to 0.3 per cent and manganese up to 1.25 per cent (preferably less), also some titanium and aluminium, up to 0.1 per cent may be included.

These steels must be subjected to suitable heat treatment, *e.g.*, two heating steps known as pre-normalising and normalising, respectively. These are described in detail and the effect of varying nickel content is graphed.

†(*Patent Application No. 21249/1947; conv. 2.8.46*).

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Technical Publications

A MODERN pulverising and grinding machine suitable for reducing sulphate and oxides, reducing drugs, resins and gums and blending pigments is the B.J.-D Atomil. This high-speed machine, which is adaptable to any site requirements, is described and amply illustrated by photographs and diagrams in a new catalogue (No. 1469) now available from British Jeffrey-Diamond, Ltd., Wakefield, Yorkshire.

* * *

THE advantages of chlorinated rubber in forming a tenacious, non-porous and non-inflammable film which resists most kinds of corrosive and deleterious materials and can be applied to almost any surface, are described in *Rubber Developments* (Vol. 2, No. 2) issued by The British Rubber Development Board.

Face shield with rubber framed goggles and clear lenses, smock, and overall leggings with spat front. An example of the many types of protective clothing for every industrial purpose illustrated in the booklet now issued by Wallach Bros., Ltd.

D

ALUMINIUM and its alloys, because of their immunity from attack by many reagents, are widely used in the chemical industry, and latterly in a host of other applications. In its latest illustrated brochure, "Aluminium in Service," the Aluminium Development Association has selected a number of examples to show the behaviour of aluminium and its alloys in many different fields and durability of service, varying from 50 years to concentrated wear and tear of only a few hours.

* * *

A COMPREHENSIVE list of welding accessories from electrode holders, plugs and sockets, carbon brushes, etc., to respirators, helmets, handshields and protective glasses and protective clothing, designed to withstand severe conditions in practical service is now obtainable from Murex Welding Processes, Ltd., Waltham Cross, Herts., in its new illustrated catalogue M.41. This also contains a useful list of other available Murex publications.

* * *

THE revised editions of four very useful technical commentaries on base exchange materials were issued last week on behalf of Joseph Crosfield & Sons, Ltd. These are: Technical publication No. 22, Soucol Brand Carbonaceous Cation Exchange Material; No. 23, Doucil Brand Base Exchange Material—data for use in the design of water softening plants; No. 24, Doucil Brand Bass Exchange Material—data for use in the design of domestic water softeners; No. 25, The Lime and Soucol Process (for pre-treating natural waters for boiler feed).

* * *

AN introductory booklet for students or trainees in the industry, "Plastics Inspection," an illustrated manual dealing with the nature of plastics materials, their methods of fabrication, properties and tests, is now available from the Office of Technical Services of the U.S. Department of Commerce, Washington, D.C. It costs $2.75. Among its contents are a timetable on the development of commercial plastics, flow charts for the production of the more common types of plastics and diagrams and photographs of test specimens and apparatus. An appendix deals with the raw materials and processes used in the manufacture of plastics and there are about 150 photographs, drawings and charts.

The Chemist's Bookshelf

HAPPIER DAYS. Recollections and Reflections of Sir Ernest Benn. 1949. London. Ernest Benn, Ltd. Pp. 222, 8s. 6d.

The immense advantage of having lived for 74 years consists in having seen a great diversity of men and events and had the opportunity of evolving a scale of values by which current happenings can be focused. Sir Ernest Benn has had both and has made good use of them and especially of the heightened capacity for seeing current events in the scale of what has gone before. In that light, the glamour which might be supposed to invest the great recent advances towards a brave new world—in which inconvenient economic factors are to be laid to rest and vexing personal responsibilities will be handled by the State or some beneficent committee—parts with whatever gilt the friction of events has left on it. The author himself explored some of these self-same paths 30 years ago and was deceived—but not for long—by the roseate prospect of equal sharing of responsibility in industry and some of the other attractive mirages which Socialist policy still uneasily preserves. It is, however, as an evocation of the life and personalities of this country during the past half century, enriched with an abundance of intimate detail, that this book appeals most. It may well evoke nostalgia as well in those fortunate enough to have known the "happier days," when a suite at the Savoy was had for £2 10s. a week and the simpler luxuries of a full family life cost weekly less than does a meal in a restaurant now.

The scope of the book is, however, much wider than the domestic scene which it brings so fully to life. It calls into view several great, and some notorious, characters whom the author as a publisher had good opportunities to study. It tells moreover in characteristically vigorous terms of the political and social changes which have robbed the country of more than its rich colouring and its inhabitants of their full individualised ways of life.

JOURNAL OF THE ELECTRODEPOSITORS' TECHNICAL SOCIETY. 1947-48, Vol. 23. 1949. London: 27 Islington High Street, N.1. Pp. viii + 239, and index; to non-members, 2 gns.

This volume comprises papers read and discussions during the winter 1947-48, already issued in paper unbound form, with the report of annual meeting (1947). During this, the 22nd session, membership continued to rise—to a total of 900. Ten meetings were held in Birmingham and 10 in London (Northampton Polytechnic), and 18 papers were read, of which 12 are published in the Journal.

In his presidential address on the relation of electrodeposition to electrochemistry, which stimulated a keen discussion, the president, Dr. G. E. Gardam, raised questions of the present relations between theory and practice which have interest not confined to the spacious territory of electrochemistry. So far as the latter is concerned, there appears to be some lack of co-ordination and it is found that "theoretical electrochemistry is less fruitful than would be expected." If much of the theory has seemed barren to the practical electrodepositor, it must be conceded that it has proved extremely interesting and perhaps helpful in the mathematical or philosophical study of matter. The subject of education and training is accordingly complex, as Dr. Gardam recognised, it being necessary to distinguish between the practical plater and the research worker. They are not usually one and the same.

Several of the papers in the present volume deal with metal polishing, which also figured prominently, it will be remembered, in the 3rd International Conference proceedings. Others are concerned with plating shop practice and layout. An interesting paper came from Czechoslovakia, by Prof. A. Glazunov, on the danger of "masked pores" and methods for their determination. Thickness testing, the interest and importance of which is constantly increasing, was the subject of two papers, including the jet-test for lead coatings. Speculum plating also is reviewed in two papers. Some of the latest developments in the production of electro-formed moulds for plastics and die casting—an important, rapidly growing field—were described in a fairly long paper by P. Spiro; and the topical interest and importance of Dr. Wernick's discourse on plating costs and their reduction, which is a paramount need today, well justified its 25 pages.

HOME

Surplus Equipment.—Surplus Government electrical, chemical and steam raising equipment is to be sold by auction during July 5-7 at the Ministry of Supply Depot, Valley Works, Rhydymwyn, near Mold, Flintshire.

Engineering and Marine Exhibition.—THE CHEMICAL AGE, together with other publications of Benn Brothers, Ltd., will be represented on stand 21, Inner Row, at the Engineering and Marine Exhibition to be held at Olympia, London, from August 25 to September 10.

End of Chemical Disposals Body.—The Pharmaceutical and Allied Chemicals Disposals Association, Ltd., 166 Piccadilly, London, W.1, which was formed in 1945 to dispose of Goverment surplus stores of pharmaceutical products has now been wound up.

Detection of Mine Gases.—Urgent need for further research in the detection and estimation of mine gases such as methane, carbon monoxide, and oxides of nitrogen is emphasised in the 26th annual report on Safety in Mines Research just issued by the Ministry of Fuel and Power. This is necessitated because of the introduction into the pits of diesel engines and the new ventilation regulations.

Shale Oil in Scotland.—Revived interest in low grade shales—which are being reclaimed and refined by modern methods—has encouraged hope in Scotland that the Fife shales and cannels may prove suitable for refining. During the 19th century oil was produced at various points in Fife from cannels and parrots-seams rich in oil. Projects for the major expansion of mining in Fife suggest the possibility that many of the seams formerly used for refining purposes may again be tapped. Improved methods of distillation are expected to offer justification for such a revival.

Awards for Students.—A series of awards to be known as the Evans Pharmaceutical Prizes, consisting of books or apparatus to the value of ten guineas, has been founded by Evans Medical Supplies, Ltd., to be presented to 18 institutions in Great Britain. The prize will be awarded to the student at each institution who is adjudged to be the best in pharmaceutics during the final year of the course for the Chemist and Druggist Qualifying Examination, or the first post-intermediate year of the course for the Pharmaceutical Chemist Qualifying Examination, or the corresponding year of the course for a degree in pharmacy.

Studying U.S. Methods.—A team of 16 men from British drop forging plants have arrived in New York to begin a six weeks' study of American methods of producing steel forgings. The team will visit 11 steel plants in six States and one in Canada.

Possible Welsh Lead Source.—The news that the lead mines at Llanrwst are being surveyed with a view to the possibility of reopening them was given at a meeting of Caernarvonshire Industrial Development Committee at Caernarvon on June 23.

Coal Output Lower.—Provisional figures of coal production for the week ended June 25 issued by the Ministry of Fuel showed a total of 4,319,100 tons (deep-mined 4,026,200 tons and open-cast 292,900 tons). This was 20,200 tons less than the previous week.

Fuel Research Centre.—The Fuel Research Station of the Department of Scientific and Industrial Research at Thorntonhall, East Kilbride, which will employ about 100 scientists and technicians, is expected to be in full operation in July. Sir Patrick Dollan, chairman of the Scottish Fuel Efficiency Committee, inspecting the station last week, said that in future prototype fuel appliances would be tested at East Kilbride, instead of Greenwich.

Bigger Plastics Exports.—Exports of plastics materials in 1948 amounted to 19,300 tons, or five and a half times the quantity exported in 1938. These figures were mentioned by Mr. Harold Wilson, President of the Board of Trade, at the annual luncheon of the Plastics Institute held in London last week. Mr. Wilson said that our largest markets for plastics materials were Australia and India, but no less than 12 per cent of the exports so far this year had gone to hard-currency areas.

Exports and Research.—Mr. Arthur Woodburn, Secretary of State for Scotland, visited the factory of British Dyewood, Co., Ltd., Shettleston Road, Glasgow, on June 24. At a subsequent Press conference, he observed that the company, concerned mainly with the manufacture of medicinal products, was now exporting 140 per cent of its original output and making a substantial contribution to the export drive. The company is setting up an advanced research department under the care of Prof. W. M. Cumming, now professor of technical chemistry at the Royal Technical College, Glasgow.

OVERSEAS

South African Cosmetics and Perfumes.—South African manufacturers are planning laboratories for the production of basic ingredients of perfumes and cosmetics, in consequence of the drastic control of imports.

Brazilian Iron and Steel.—According to the report for 1948 issued by the Brazilian Volta Redonda Iron and Steel Works, the largest unit of its kind in South America, pig-iron production amounted to 220,000 tons and steel output to 240,000 tons. In addition 260,000 tons of coke, 2.7 million litres of liquid fuels and 8 million tons of tar for road making purposes were manufactured.

Norwegian Metals Expansion. — The Falconbridge nickel factories are to develop and modernise their plant at Kristiansund. Production of electrolytic nickel will be increased by 50 per cent. Production of cobalt and nickel sulphate will also be transformed and later there will be an annual production of 14,000 tons of nickel and 7000 tons of copper.

India Frees Paint and Varnish Exports.—In pursuance of its policy of progressive liberalisation of export control, the Government of India has decided that exports of paints, enamels and varnishes, containing lead and/or zinc, which were hitherto allowed on a quota basis only, will be licensed freely to all permissible destinations for a period of three months, the first instance, from June 1.

Sodium Nitrate Recovery.—An application has been made by the Compania Salitrera Anglo-Chilena for water rights in connection with an evaporation plant for the production of nitrate of soda and similar products. This method of increasing total output is of interest because the residue nitrate and other valuable by-products will be extracted from the dumps left over from the working of other extraction processes.

Spanish Potash Plan.—The report of the Banco Urquijo presented to the General Assembly mentions that the plan for 1950 for the potash industry proposes the production of 200,000 tons, rising to 250,000 tons in 1952. This should permit the export of 140,000 and 190,000 tons respectively. Before the civil war, production was 70,000 tons of which 71 per cent was exported. Last year production was 150,000 tons, of which two-thirds was exported. To reach the production envisaged, personnel will be increased and separating machinery imported.

Cape Aloes.—Intensive harvesting of aloes for medicinal use has been proceeding at the Cape and in the south-west area of South Africa. Large quantities are exported, and it is claimed that Mossel Bay, Albertinia and Riversdale are now the world's chief production areas.

Indian Duty Prolonged.—The protection afforded to the calcium chloride industry in India, which was due to expire on March 31, 1949, has been extended up to March 31, 1950, by the Protective Duties (Miscellaneous Provisions) Act, 1949. The duty is Rs. 4-14-0 per cwt. (standard) and Rs. 3-4-0 (U.K. Preferential).

U.S. Sulphur Output Up.—Production of sulphur in the U.S.A. in March reached a total of 402,711 long tons, an increase of nearly 15 per cent over the previous month. The total for the first quarter of 1949 was 1,170,475 long tons, only slightly lower than the first three months of 1948. Apparent sales in the first quarter of 1949 were 7660 long tons more than in 1948.

Israel Penicillin Project.—Business interests in the U.S. Switzerland and Scandinavia are planning the production of penicillin in Israel on a large scale. The plant envisaged, which would require an outlay of about £500,000, would also produce streptomycin, tyrothricin, and other medical preparations. It is hoped to develop a large export market.

Nigerian Oils for Britain.—A three-year agreement for the supply of oils and oil-seeds to Britain was signed last week by Mr. John Strachey on behalf of the Ministry of Food, and Sir Sydney Phillipson, chairman of the Nigerian Produce Marketing Co. The contract is from January 1, 1950, and will ensure a continuation of supplies. They are expected to total 900,000 tons a year in terms of raw materials, or 500,000 tons in oils and their equivalent—about the same as in previous years.

Swiss Chemical Exports Drop.—Official Swiss statistics show that exports of chemical and pharmaceutical products declined from Fr. 37.2 million in April to Fr. 35.7 million in May. While shipments of aniline dyes and indigo rose from 14.6 to 15.5 million Swiss francs, those of industrial chemicals fell from 7.3 to 5.5 and sales abroad of pharmaceutical products declined from 15.3 million to 14.7 francs. Sales of perfumery at 2 million francs were lower by 100,000 francs.

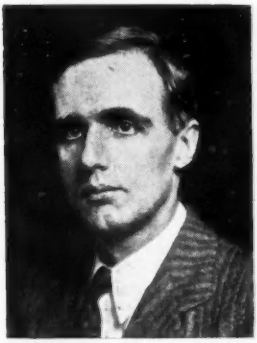
PERSONAL NEWS

PROF. E. C. BULLARD, professor of physics in the University of Toronto, has been appointed by the Lord President of the Council to be director of the National Physical Laboratory. He is expected to take up his post in January, in succession to Sir Charles Darwin. In 1931 the professor was made demonstrator in geodesy when that post was created at Clare College, Cambridge. He was elected to the Smithson Research Fellowship of the Royal Society in 1936 and during the war he carried out important work for the Admiralty on de-gaussing of ships against the magnetic mine. The professor was made a Fellow of the Royal Society in 1941.

MR. DAVID A. SHEPHARD, chairman of the Anglo-American Oil Co., Ltd., since 1945, has resigned to take up a position in New York as executive assistant to the president of Standard Oil Co. (New Jersey). He will be succeeded by MR. R. A. CARDER, who will continue to act as managing director, a post which he has held since 1939. Other appointments announced by the Anglo-American Oil Co., Ltd., are that of MR. LEONARD SINCLAIR as an additional managing director, and MR. HOWARD W. PAGE, executive assistant to the president of Standard Oil Co., Ltd., as director.

The Croonian Lecture for 1949 was delivered at the Royal Society, London, last Thursday, by DR. W. BRONK, Foreign Member. He discussed "The Rythmic Action and Respiration of Nerve Cells." Dr. Bronk is foreign secretary of the National Academy of Sciences and chairman of the National Research Council of the U.S.A. As director of the Johnson Institute for medical physics, Pennsylvania University, he has greatly influenced the development of biophysics in America.

The Latin of the Public Orator was put to a severe test in dealing with such modern topics as jet engines and nuclear physics when SIR FRANK WHITTLE and SIR JOHN COCKROFT, director of the Atomic Energy Research Establishment at Harwell, both of whom received the D.Sc., were among a distinguished gathering on whom honorary degrees were conferred at Oxford last week.



Prof. E. C. Bullard

At the banquet to delegates of the Fourth Empire Mining and Metallurgical Congress in Guildhall, London, on Monday, July 11, the president, SIR HENRY TIZARD, will propose the Loyal toast and the toast of the Royal family, to which H.R.H. THE DUKE OF GLOUCESTER will reply. "The Mineral and Metal Industries of the British Empire" will be proposed by MR. H. T. N. GAITSKELL (Minister of Fuel and Power) and responded to by MR. H. C. RICKABY, deputy Minister of Mines, Toronto. The reply to "The Guests" will be given by the LORD MAYOR OF LONDON and MR. D. G. MALHERBE, Government Mining Engineer, Union of South Africa.

MR. H. M. GOODY has been appointed managing director of Cantie Switches, Ltd., following the removal of the business from Chester to a new and larger factory at New Ferry, Bromborough, Cheshire. Mr. Goody joined the associated company of Brookhirst Switchgear, Ltd., in 1920, became a director in 1937, and in 1941 was appointed joint managing director.

Obituary

The death was announced recently in Berlin of PROF. OTTO LIEBKNECHT, 73, professor of chemistry, Humboldt University.

The death occurred in Huddersfield last week of MR. WILLIAM D. PENLY, 62, chief pyrotechnist at the Standard Fireworks Co., Huddersfield, where he had served nearly 40 years. His father and grandfather were also pyrotechnists.

FULLER COLONIAL RESEARCH

£2½ Million Yearly

UNDER the Colonial Development and Welfare Act of 1945 no more than £1 million a year might be spent on Colonial research, said Mr. Creech Jones, Secretary of State for the Colonies, recently, when introducing the second reading of the 1949 Act. This new Bill proposes to increase to £2½ million the annual amounts payable from public funds for carrying out schemes under the Acts of 1940 and 1945.

Centred on London

When the Colonies were allocated funds under the 1945 Act for their ten-year plans, said Mr. Creech Jones, it was also proposed that there should be a number of centrally organised services, mostly in London. These included training schemes for the Colonial Service, higher education, and survey work, as well as research. To finance them, over £23.5 million was set aside under the Act, of which some £10 million was available for research, which was co-ordinated by the numerous colonial research committees in the United Kingdom.

At the end of March this year the sums spent on research amounted to £1,541,000. Under the Act, 319 research schemes had been approved, and it was estimated that 40 per cent of the expenditure involved was on agriculture, veterinary and forestry research, 13 per cent on fisheries, 10 per cent on medical research, 9 per cent on tsetse, 5 per cent on insecticides, and 5 per cent on products research, etc. About 30 per cent of the work was likely to be carried out in East Africa, 20 per cent in West Africa, and 15 per cent in the West Indies.

Expenditure on research schemes in the year ending March 31, 1949, was about £750,000, nearly half the total amount spent up to that date, and it was expected that in the coming year expenditure would amount to some £1.6 million.

The organisations that dealt with the problems of research were not only in the United Kingdom. New centres of research were being created in the Colonies and experimental and demonstration work was being encouraged. Research institutes were being attached to the new colonial universities and university colleges, and special missions were undertaking investigations in every field. In these and other ways the basic knowledge necessary to tackle the problems involved in development work was being acquired and applied.

NEXT WEEK'S EVENTS

MONDAY, JULY 4

Royal Institution

London: 21 Albemarle Street, W.1, 5.0 p.m. General monthly meeting.

TUESDAY, JULY 5

Commonwealth and Empire Health and Tuberculosis Conference

London: Central Hall, Westminster (until July 8). Discussions; visits to hospitals and sanatoria; exhibition of X-ray apparatus and pharmaceutical products, technical books, etc.; tours of general interest and social events.

THURSDAY, JULY 7

The Royal Society

London: Burlington House, Piccadilly, W.1, 2.15 p.m. Prof. A. V. Hill will open a discussion on "Muscular Contraction and Relaxation: Their Physical and Chemical Basis." Contributions are expected from: Prof. W. T. Astbury, F.R.S., E. J. Conway, F.R.S. (Dublin), M. Dubuisson (Liège), H. H. Weber (Tübingen) and Dr. Dorothy Needham, F.R.S. 10.15-12.45 a.m.: Demonstration of experiments in the Biophysics Research Unit, University College, London.

Underground Mining Machinery Exhibition

London: Earls Court (until July 16).

FRIDAY, JULY 8

Photoelectric Spectrometry Group

London: Institute of Physics, 47 Belgrave Square, S.W.1, 2.30 p.m. Dr. W. C. Price, Dr. M. H. F. Wilkins and G. Brown of King's College: "Selected Topics in Ultraviolet Spectrophotometry" (including spectra of hydrocarbons in the near and vacuum ultraviolet, biological applications and low temperature techniques); Dr. A. Elliott (Courtaulds Ltd., Research laboratory): "The Technique and Applications of Polarised Infra-Red Spectrophotometry."

SATURDAY, JULY 9

Fourth Empire Mining and Metallurgical Congress

London and Oxford (until July 23): About 600 delegates and members representing 27 countries will attend. Headquarters: Grosvenor House, Park Lane, London, W.1.

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

BARCLAY-STUART (PLASTICS), LTD. (formerly Barclay Stuart Engineering Works, Ltd.), London, E.C. (M., 2/7/49.) May 25, £2500 charge, to English Estates Assurance, Ltd.; charged on 25 and 27 Brunswick Street, and factory and outbuildings in Duke Street, Luton. *Nil. December 30, 1948.

LAVIS SERVICES, LTD., Heaton-with Oxcliffe. (M., 2/7/49.) May 23, mort., to Midland Bank, Ltd., securing all moneys due or to become due to the bank; charged on land with workshop at White Lund, Morecambe and Heysham, with fixtures, etc.

LIPTON'S CHEMICAL CO., LTD., London, W. (M., 2/7/49.) May 19, mortgage to Midland Bank, Ltd., securing all moneys due or to become due to the bank; charged on 16, 17 and 18 West Hampstead Mews, Hampstead, and fixtures. *Nil. December 31, 1944.

OAKES EDDON & CO., LTD., Liverpool. (M., 2/7/49.) May 27, £260 mortgage to Pelican Property Co., Ltd.; charged on 99 Prescot Street, Liverpool. *Nil. Dec. 30, 1948.

Satisfaction

FREERS CHEMICAL WORKS, LTD., Bishops Stortford. (M.S., 2/7/49.) Satisfaction May 25, of debs. reg. June 4, 1946.

Receivership

BALDWIN CHEMICAL INDUSTRIES, LTD., London Road, Harlow, Essex. (R. 2/7/49). Mr. D. D. Mathieson, of 103 Cannon Street, E.C.4, was appointed receiver and manager on May 18, 1949, under powers contained in debenture dated October 7, 1947.

Company News

Amber Chemical Industries, Ltd.

Group trading profits for the first year since its incorporation on January 1, 1948, amounted to £63,407. Net profit was £52,437. A final dividend of 15 per cent on ordinary shares is proposed.

Laporte Chemicals

Consolidated profit of the company and its subsidiaries for the year ended March 31, £495,633 (£350,936). Net profit £396,467 (£259,990). Proposed final ordinary dividend 12½ per cent (same).

Timothy Whites and Taylors

The consolidated profit and loss account for 53 weeks ended January 1, 1940, shows trading profits and sundry income £1,083,519 (£1,490,201), plus £100,000 (nil) release of provision against variation in purchase tax. Profit of the parent company was £331,867 (£377,213). A dividend of 32½ per cent (same) is recommended.

Chemical and Allied Stocks and Shares

THE further heavy fall in British Funds has been reflected in other sections of markets, emphasising the widespread anxiety regarding economic affairs and fears of renewed drains on Britain's gold and dollar reserves. The position may be clarified by the latest talks on the question of convertibility of European currencies; but if a deadlock persists, the special conference of Commonwealth finance ministers may have to be awaited before any final decision is made.

Sir Stafford Cripps is apparently afraid that the sequel to convertibility of European currencies might be very heavy drains on the sterling area's gold reserves. Britain might then have to face more austerity resulting from reductions in the food and other imports that would become necessary in order to save dollars.

Absence of demand has been as much responsible for this decline as has selling. The biggest sufferers have been the nationalisation stocks, which on Monday showed losses ranging up to £2 10s. British Gas stock was heavily hit, particularly as over £18 million more of this stock has now been issued as compensation to stockholders in the old gas companies. Fears that the market price might fall further led to a good deal of selling of Gas stock, which has been one of the factors contributing to the heavy slump in British Funds, which later, showed a small rally, and this gave markets a better undertone.

Industrial shares have been affected by the general trend of markets and shares of chemical and kindred companies also

lost ground, although on balance most falls were fairly moderate.

Prior to the current slide in gilt-edged prices, industrial shares had been marked down heavily in many cases; and to some extent the gilt-edged fall is a reaction to the trend in industrial shares during the past two months.

Imperial Chemical receded to 43s. 9d., Monsanto were 50s., Fisons 44s., Albright & Wilsons 28s. 9d., Bowmans Chemicals 4s. shares 7s., Amber Chemical 6s., while elsewhere, Glaxo Laboratories had been marked down from the £18 level to £16 at the time of writing. Boots Drug, however, after declining, strengthened to 47s. in anticipation of the full results and annual meeting. United Molasses were down to 36s. 6d. and later 37s., with Turner & Newall 70s. 6d. after 69s. 6d. Levers were 44s. 1½d. and Lever N. V. 42s. 1½d. while British Match were weak, falling to 30s.

Among shares of companies with plastics and allied interests, De La Rue fell heavily to 24s. 4½d. but were later 25s. British Xylonite were 66s. 3d. with British Industrial Plastics 2s. shares at 4s. Elsewhere, British Glues and Chemicals have changed hands around 17s. 9d.

Although the market is expecting good results with the dividend maintained, the 4s. units of the Distillers Co. were back to 24s. 10½d. and Dunlop Rubber 60s. 9d. Borax Consolidated at 51s. were fairly steady among shares of companies with important American interests and dollar income from the United States.

In other directions, British Aluminium moved back to 42s. 6d., and awaiting the new issue terms, Ilford were 23s. 10½d. although this and other projected new issues may, of course, be postponed until market conditions are less perplexing.

British Drug Houses 5s. shares were 6s 6d. and Beechams deferrred eased further to 11s. 3d. Iron and Steels were again lower and those scheduled for nationalisation moved further below their official "take-over" levels. Dorman Long were 27s. 6d., United Steel 25s. 3d. and Stewarts & Lloyds 53s. Oils were no exception to the general trend. Anglo Iranian being £7 and Shell 58s. 9d.

British Chemical Prices

Market Reports

ALTHOUGH trading conditions cannot be described as brisk, the general movement on the industrial chemicals market this week has been steady with the usual flow of routine buying orders. Delivery specifications, particularly for the textile industry, have been on a good scale and the volume of inquiry for export continues to be satisfactory. There is a good outlet for both solid and liquid caustic soda, sodium sulphide and bichromate of soda. The demand for chlorate of soda continues to be in excess of available supplies. There is little change among the potash products which remain firm. At the time of this report no price changes had been reported for acetic anhydride or acetone and business is quiet with lower quotations expected. A good demand is reported for the red and white leads at the recently reduced quotations and rather more inquiry has been reported for the copper compounds. A number of items which have been on the exemption list will now become chargeable with Key Industry Duty as from July 1. These include oxalic acid, methylene chloride and urea. The revised list of exemptions are published under S.I. 1158. A quiet trade is reported from the coal tar products market and apart from contract deliveries movement has been of small dimensions. Pitch is a possible exception and is in good request both for home and export.

MANCHESTER.—In the home section of the trade holiday conditions continue to affect the movement of supplies on the Manchester chemical market to the textile mills and other industrial consumers, but apart from this seasonal influence the demand during the past week has been described as reasonably satisfactory, with the general run of alkali products, as well as the potash and magnesia compounds and a wide range of other chemicals being called for in steady quantities. There has been a fair amount of inquiry also on export account. In the fertiliser market business is seasonally quiet in most sections, while taking the tar products market as a whole the demand has been only moderately active.

GLASGOW.—Conditions generally in the Scottish chemical market have not been quite so active. Certain types of business are now very quiet and this is being reflected in a slackening of demand for chemicals. This particularly applies to chemicals used by the paper trade. On the other hand, with more and more new factories being opened in Scotland, a few of which are large chemical buyers, the general volume of business is being maintained. There have been no particular demands of outstanding character and the supply position is fairly satisfactory. The export market has been a little more active than usual.

Patent Processes in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patents Office, Southampton Buildings, London, W.C.2. at 2s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Handling of plastic sheets and apparatus for use in moving material in sheet form—Turners Asbestos Cement Co., Ltd., and W. H. Rooksby. June 8, 1945. 621,111.

Plants for the treatment of asbestos-cement or like sheets in the plastic state.—Turner Asbestos Cement Co., Ltd., and W. H. Rooksby. June 8, 1945. 621,113.

Iron chromium-manganese alloys.—Soc. d'Electro-Chimie, d'Electro-Metal lurgie et des Acieries Electriques d'Ugine. June 9, 1942. 621,116.

Alkylene cyanohydrins.—A. H. Stevens. (American Cyanamid Co.) Aug. 3, 1945. 621,117.

Amino acids.—Winthrop Chemical Co., Inc. Dec. 19, 1944. 621,477.

Rotary fluid meter.—A. R. J. Ramsey. (R. N. Brodie Co.) Dec. 21, 1945. 621,205.

Decarburisation of iron or iron alloy castings.—Birlec, Ltd., and P. F. Hancock. Jan. 23, 1946. 621,496.

Process for the production of esters of mono-methylene-ethers of 2 ketone-1-gulonic acid.—Chemische Fabriek Naarden. Aug. 3, 1943. 621,209.

Apparatus for the storage and distribution of carbon-bisulphide and other liquids.—D. Bywater. March 21, 1946. 621,127.

Processes of treating starch and dextrin and the products resulting therefrom.—Corn Products Refining Co. July 18, 1945. 621,128.

Synthetic bonding agent.—Stidvigs & Halsingborgs Limfabrieker A/B. March 29, 1946. 621,129, 621,130.

Extrusion of strips or ribbons from thermoplastic materials.—S.P.A. Lavorazione Materie Ulastiche. March 28, 1945. 621,211.

Process for recovering an ascorbic acid compound. Merck & Co., Inc. June 15, 1945. 621,292.

Plants for the treatment of asbestos-cement or like sheets in the plastic state.—Turners Asbestos Cement Co., Ltd., and W. H. Rooksby. June 8, 1945. 621,135, 621,136.

Copper-tin alloy plating.—Metal & Thermit Corporation. Jan. 5, 1946. 621,217.

Control of the rate of flow of fluids.—R. H. Froude. Aug. 12, 1946. 621,395.

Working and heat-treating beryllium-copper alloys.—J. G. Gaunt. (Beryllium Corporation.) Aug. 23, 1946. 621,224.

Purification of sugar solutions.—American Cyanamid Co. Nov. 17, 1945. 621,225.

Process for the gasification of carbonaceous materials and for the manufacture of water gas therefrom.—C. Arnold. (Standard Oil Development Co.) Sept. 10, 1946 621,512.

Recovery of riboflavin.—Merck & Co., Inc. Oct. 31, 1945. 621,481.

Process and apparatus for the operation of gas producers.—O. A. Ohlsson. Aug. 8, 1946. 621,517.

Production of sulphuric acid or oleum.—I.C.I., Ltd., F. A. F. Crawford, and J. Bell. Oct. 9, 1946. 621,158.

Stabilisation of edible oils and fats.—Universal Oil Products Co. Oct. 24, 1945. 621,519.

Manufacture of carboxylic acids.—W. H. Groombridge Oct. 16, 1946. 621,520.

Synthetic resin adhesives.—I.C.I., Ltd., E. J. G. Balley, and J. M. J. De M. Estevez. Oct. 18, 1946. 621,165.

Firegrates or furnaces for burning solid fuels.—C. F. Wade. Nov. 2, 1946. 621,521.

Manufacture of long chain alkyl-substituted aromatic hydrocarbons.—E. I. Du Pont de Nemours & Co. Nov. 28, 1945. 621,179.

Manufacture of chlorinated aliphatic acids.—A. R. Hammond, J. A. John, and R. Page. Jan. 13, 1947. 621,531.

Manufacture of tertiary carbinols.—Roche Products, Ltd., A. L. Morrison, and H. Rinderknecht. Jan. 17, 1947. 621,231.

Manufacture of aqueous emulsions.—I.C.I., Ltd., A. J. Watters, and D. M. Shepherd. Jan. 17, 1947. 621,188.

Purification of β-ionone.—L. E. Jones. (Distillation Products, Inc.) Feb. 1, 1947. 621,412.

Manufacture of symmetrical dichlormethyl tetramethyldisiloxane.—Corning Glass Works. Feb. 13, 1946. 621,243.

Coating of surfaces.—Schori Metallising Process, Ltd., and W. D. Jones. Feb. 10, 1947. 621,244.

Manufacture of sulphonamides.—British Celanese, Ltd. Feb. 14, 1946. 621,284.

Inoculants for cast iron.—Mond Nickel Co., Ltd. March 15, 1946. 621,260.

Preparation of sulphonamide derivatives.—Wellcome Foundation, Ltd., B. C. Platt, and T. M. Sharp. Feb. 13, 1947. 621,289.

Casting metal.—New Jersey Zinc Co. June 25, 1946. 621,269.

Manufacture of 1-phenyl-2-dimethyl-amino-methylcyclohexan-1-ol.—I.C.I., Ltd., J. A. Hendry, and W. S. Waring. Feb. 14, 1947. 621,292.

Photo: Courtesy Imperial Chemical Industries Ltd., Billingham

Manufacture of varnish resin interpolymers.—Dow Chemical Co. Feb. 23, 1946. 621,542.

Holders for electrodes of carbon or other material adapted for use in electric arc welding.—R. A. Copeland. Feb. 17, 1947. 621,314.

Manufacture of semi-esters of dicarboxylic acids.—Ciba, Ltd. Feb. 17, 1946. 621,324.

Electrolytic cells.—I.C.I., Ltd. Feb. 18, 1946. 621,550.

Aluminium base alloys.—I.C.I., Ltd., R. Chadwick, and G. H. Blenkarn. Feb. 19, 1947. 621,336.

High temperature alloys.—British-Thomson-Houston Co., Ltd. (General Electric Co.) Feb. 21, 1947. 621,361.

Production of alkali-resistant alginate materials.—Alginate Industries, Ltd., J. B. Speakman, N. H. Chamberlain, and C. M. C. Dorkin. Feb. 21, 1947. 621,262.

Production of the ammonium salts of penicillin.—Distillers Co., Ltd., P. Eaglesfield, and H. Tozer. Feb. 25, 1947. 621,434.

Manufacture of synthetic oestrogenic agents.—British Schering Research Laboratories, Ltd., D. H. Hey, P. R. Carter, W. H. Hook, and M. E. H. Fitzgerald. Oct. 26, 1944. 621,460

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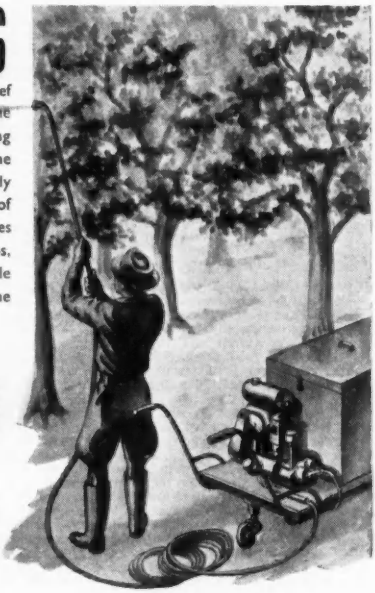

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SITUATIONS VACANT

None of the vacancies in these columns relates to a man between the ages of 18 and 50 inclusive, or a woman between the ages of 18 and 40 inclusive, unless he or she is exempted from the provisions of the Control of Engagement Order, or the vacancy is for employment exempted from the provisions of that order.

DRAUGHTSMEN required at our Witton, Birmingham Works. Vacancies for men with knowledge of General Chemical Plant and the fabrication (in all metals) of storage tanks and processing vats, mixing pans, jacketed pans, pressure vessels, etc., etc. Good positions with excellent prospects are available for men with ability and initiative. Please write full details in complete confidence, to WORKS DIRECTOR, The London Aluminium Co. Ltd., Westwood Road, Witton, Birmingham, 6.

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SITUATION VACANT

WORKS Chemist required, B.Sc. or A.R.I.C., capable of organising laboratory and factory work. Previous experience of insecticide manufacture an advantage but not essential. Salary according to experience. Applications, giving full particulars, and salary required, to GENERAL MANAGER, Day Son & Hewitt Ltd., 22, Dorset Street, London, W.1.

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Particulars of the proposed amendment were set forth in the Official Journal (Patent) No. 3149, dated June 22nd, 1949.

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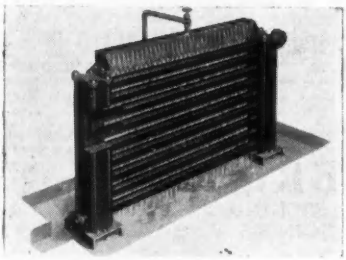

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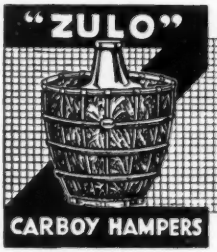

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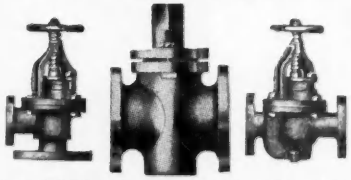

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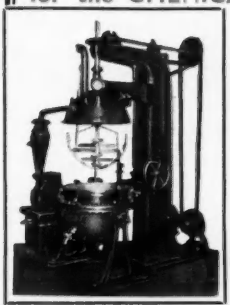

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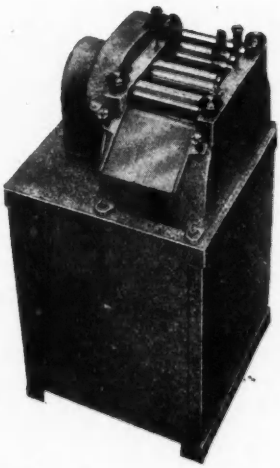

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